shows about 1.14 U. S. gallons per hour consumption for Massey-Ferguson tractors. The Nebraska Tractor Test Data book for 1969 reports that this type of tractor should use 1.44 U. S. gallons per hour with "average load".

Table XII

COSTS OF OPERATION --TRACTORS

	NORTH			CENTRAL			SOUTH		
	Afs/ Hour	Afs/ Year	Total	Afs/ Hour	Afs/ Year	Total	Afs/ Hour	Afs/ Year	Total
Fuel*	27.0		32,076	17.2		37,685	17.0		25,500
Plowing	31.2			20.0			18.6		
Hauling	18.6			11.6			13,7		
Oil		4,889	4,889		6,102	6,102		4,104	4,104
Grease			508			569			3,645
Transmission								2,640	
Lubrication		508			569			1,005	
Filters									7,210
Air Cleaner								1,788	
Oil								2,289	
Diesel								3,133	
Wages			19,320**			18,996**			24,000**
Driver		12,852			13,500			18,864	
Cleaner		2,268			1,296			936	
Repairs			7,844			8,092			27,906
Total Operating Costs			64,637			71,444			92,365

*Total Fuel Costs are obtained as follows:

((afs hr plowing x 2) (afs hr hauling x 1)] + 3) (average hours per year)

**Total wages includes 4200 afs per year for food, clothing and housing for drivers and cleaners. Most operators did not employ cleaners.

Indamer Workshop in Kabul provided standard prices for oridinary maintenance items. From notes on interview schedules, we found that some central and southern tractor owners are obtaining some of these items cheaper from other sources, particularly Pakistan. This is not intended as a criticism of Workshop policy and prices because our study does not include this phase of tractors in Afghanistan, and actual costs reported by owners are not high, on the average.

It is felt that most categories of costs of operation, especially in the north and central areas, are under-reported. Rough calculations indicate that costs per hour including depreciation are the afghani equivalent of about $1.40 in the south. This compares with costs of over $2.50 in the U. S. A. for this type of tractor.

"Down-Time" or the amount of time a tractor is inoperable awaiting repairs, is somewhat high.

Wages for tractor drivers are an expense not normally encountered in the U. S. and other countries, as the farm family usually does this. Wages for driver and driver's helper (cleaner) amount to about 20,000 afs per year -- roughly one-fourth of total costs. However, from notes on the questionnaire, this seems to be money well spent under current conditions. In more than one instance, inexperienced drivers certainly do not get the highest and best use of their machines. Most tractor owners were able to employ experienced drivers with some difficulty, but these drivers commanded a fairly high wage -- usually 2,000 afs per month.

As mentioned previously, taxes are an unknown, but possibly very significant, cost factor.

Effects of Tractors:

An attempt was made to measure changes in land use, crop production, sales of agricultural products, and labor and animal power. Terms of reference for the change were "before tractor was purchased" (which was, generally speaking, three years prior to enumeration or 13[illegible]) and "1357" -- the crop year immediately preceeding enumeration. Respondents were also asked to indicate if these changes (when change took place) was or was not due to tractor ownership.

On Area Cultivated Annually:

Table XIII shows overall land use before tractor and in 1357. A brief interpretation of this table reveals that tractors were responsible for an increase in farm size, number of jeribs planted, and jeribs irrigated. Largest increases were in rented land and there was a decrease in owned jeribs of dryland. This indicates that some owned acreage was brought under water command as a result of tractor ownership.

Table XIII shows changes in land use by area and Table XIV is a distribution of jeribs planted and farm size.

On Crop Production and Yields:

Table XV shows percent changes in area planted, production, and yield of various crops. When change was attributed to tractor ownership, area and production of all crops increased. Yield also increased for all crops except mung beans and chick-peas, clover and alfalfa, and oilseeds.

Wheat is by far the most important crop in Afghanistan and also the only crop for which fairly reliable production data is available for the entire country. Wheat production actually did increase for the entire country by about 30 percent from 1344 to 1347 and much of this increase was from dryland acreage. According to Table XV, wheat production increased 98 percent for irrigated and 1428 percent for dryland on farms which attributed change to tractor ownership. (See Price and Crop Outlook for Afghanistan - August 1968 and September 1967 - available at USAID/Agriculture Division) This increase was attributed to favorable weather and higher prices.

As will be discussed later, the overall production increases could be valued at about 133,000 afs, almost half of which was sold.

(On Sales of Farm Products:)

Table XIX shows average sales in seers per farm and percent for the overall study. The average value of increased sales per farm is about 55,000 afs. Sales of all agricultural commodities (on farms that attributed change to tractor ownership) increased except in the case of fruits. In addition to increases in sales, more farms reported any sales during 1347 than before tractor was purchased. Tables XX, XXI, and XXII show sales by area.

Table XIII

CHANGES IN LAND USE BEFORE AND AFTER TRACTOR PURCHASE
AVERAGE JERIBS PER FARM REPORTING

	OVERALL					
	Change due to Tractor Ownership					
	YES			NO		
	Before	1347	%△	Before	1347	%△
Jeribs Irrigated						
Owned	315	606	+92	1007	1050	+4
Rented	0	15		315	291	-8
Jeribs Dryland						
Owned	770	354	-54	336	175	-48
Rented	32	653	+1941	0	0	--
Jeribs Planted			?			
Owned	354	547	-55	286	443	+59
Rented	32	558	+1644	0	50	
Jeribs Fallowed						
Owned	230	319	+39	1253	1270	+1
Rented	20	20	0	35	90	+157

TABLE XIII
CHANGES IN LAND USE BEFORE AND AFTER TRACTOR PURCHASE
AVERAGE JERIBS PER FARM REPORTING

	NORTH: Change Due to Tractor Ownership?						CENTRAL: Change Due to Tractor Ownership?					
	Yes			No			Yes			No		
	Before	1347	%Δ	Before	1347	%Δ	Before	1347	%Δ	Before	1347	%Δ
Jeribs Irrigated												
Owned	190	250	+32	525	604	+15	404	860	+113	1111	1186	+7
Rented	0	10	∞	0	50	∞	0	0	---	0	0	--
Jeribs Dryland												
Owned	0	210		99	99	0	770	390	-49	653	235	-64
Rented	32	653	+1941	0	0	--	0	0	--	0	0	--
Jeribs Planted												
Owned	198	371	+87	450	480	+7	200	487	+143.5	281	512	82
Rented	32	558	+1644	0	50		0	0	---	0	0	--
Jeribs Fallowed												
Owned	81	178	+120	180	180	0	46	238	+417	45	346	+669
Rented	0	0	--	0	0	--	0	0	--	0	0	--

Note: One landowner in the wouth had 13,634 jeribs owned, irrigated. No change after tractor purchase.

Table XIII

(Continued)

SOUTH

	Change Due to Tractor Ownership?					
	YES			NO		
	Before	1347	%Δ	Before	1347	%Δ
Jeribs Irrigated						
Owned	0	0	--	1213	1213	0
Rented	0	20	∞	315	332	+5
Jeribs Dryland						
Owned	0	0	--	0	0	--
Rented	0	0	--	0	0	--
Jeribs Planted						
Owned	540	685	+27	243	243	0
Rented	0	0	--	0	0	--
Jeribs Fallowed						
Owned	564	564	0	1789	1789	0
Rented	20	20	0	35	95	+157

Table XIV

DISTRIBUTION OF TOTAL JERIBS PLANTED AND TOTAL JERIBS IN FARM BEFORE TRACTOR PURCHASE AND IN 1347

Total Jeribs Planted	NORTH		CENTRAL		SOUTH		OVERALL	
	Before	1347	Before	1348	Before	1347	Before	1347
0	1	--	--	--	--	--	1	--
1 - 99	1	--	5	2	1	--	7	2
100 - 199	6	2	1	1	5	2	12	5
200 - 299	2	4	2	2	4	4	8	10
300-- 399	1	1	--	1	4	3	5	5
400 - 499	2	--	3	1	2	2	7	3
500 - 699	1	5	1	3	--	4	2	12
700 - 999	--	--	--	2	--	1	--	3
1000 - 1499	--	2	--	--	1	1	1	3
1500 - 1999	--	--	--	--	--	--	--	--
2000 - 2999	--	--	--	--	--	--	--	--
3000 +	--	--	--	--	1	1	1	1

Total Jeribs In Farm	NORTH Before	NORTH 1347	CENTRAL Before	CENTRAL 1348	SOUTH Before	SOUTH 1347	OVERALL Before	OVERALL 1347
0	--	--	--	--	--	--	--	--
1 - 99	--	--	3	1	--	--	3	1
100 - 199	4	1	1	--	--	--	5	1
200 - 299	3	3	2	2	3	3	8	8
300 - 399	--	1	--	1	2	2	2	4
400 - 499	2	1	--	--	2	2	4	3
500 - 699	3	4	2	2	6	6	11	12
700 - 999	--	--	--	--	2	2	2	2
1000 - 1499	2	4	1	2	2	2	5	8
1500 - 1999	--	--	1	2	--	--	1	2
2000 - 2999	--	--	2	1	--	--	2	1
3000 +	--	--	--	1	1	1	1	2

Table XV

FARM CROP PRODUCTION -- PERCENT CHANGES IN YIELD AND CROPPING PATTERNS BEFORE AND AFTER TRACTOR PURCHASE ON FARMS OF TRACTOR OWNERS IN AFGHANISTAN

OVERALL

	Change Due to Tractor Ownership			Change NOT Due to Tractor Ownership		
	Area	Production	Yield	Area	Production	Yield
Irrigated Wheat	+58.9	+9[illegible].1	+24.9	-0.4	+1.2	+1.3
Dryland Wheat	+1233.6	+1423.7	+14.9	+650.0	-28.6	-39.7
Barley	+42.6	+119.8	+54.1	+40.7	+25.7	-10.6
Corn	+240.5	+370.7	+33.3	+4.2	+16.4	+11.6
Cotton	+102.2	+209.4	+53.2	+13.0	-37.3	-44.4
Mung Beans & Chick-Peas	+244.6	+103.5	+39.5	-95.6	-74.1	+434.1
Clover & Alfalfa	+263.8	+38.3	-48.2	+3.2	+23.1	+19.5
Oilseeds	+225.3	+196.5	-9.2	+200.0	+200.0	NC
Other	+172.5	+343.2	+343.2	-19.6	+16.1	+168.4

TABLE XVI

A. FARM CROP PRODUCTION - PERCENT CHANGE IN YIELD AND CROPPING PATTERNS BEFORE AND AFTER TRACTOR PURCHASE ON FARMS OF TRACTOR OWNERS IN NORTHERN AFGHANISTAN

NORTH

	Change Due to Tractor Ownership			Change NOT Due to Tractor Ownership		
	Area	Production	Yield	Area	Production	Yield
Irrigated Wheat	+86.2	+145.9	+32.1	+71.4	+55.9	-9.0
Dryland Wheat	+1007.6	+1788.2	+71.0	--	--	--
Barley	+119.6	+261.6	+65.0	-21.4	+25.9	+60.2
Corn	+33.3	+526.3	+296.8	--	--	--
Cotton	--	--	--	+51.9	+36.7	+58.4
Mung Beans & Chick-peas	+32.4	+85.3	+40.0	--	--	--
Oil Seeds	+116.7	+186.4	+33.0	--	--	--

TABLE XVII

B. FARM CROP PRODUCTION - PERCENT CHANGES IN YIELD AND CROPPING PATTERNS BEFORE AND AFTER TRACTOR PURCHASE ON FARMS OF TRACTOR OWNERS IN CENTRAL AFGHANISTAN

CENTRAL

	Change Due to Tractor Ownership			Change NOT Due to Tractor Ownership		
	Area	Production	Yield	Area	Production	Yield
Irrigated Wheat	+18.0	-6.1	-20.6	0	+13.6	-13.5
Dryland Wheat	+1670.7	+381.8	-73.7	+429.4	+25.0	-76.1
Clover & Alfalfa	+353.0	+ 88.3	-58.6	+20.0	+23.1	+2.59
Oil Seeds	+508.7	+229.4	-45.2	--	--	---

Table 5.

COSTS (AFGHANIS) PER JERIB OF PRODUCING
IRRIGATED WHEAT-IMPROVED METHOD
AFGHANISTAN -- 1968

	Units Per Jerib (seers)	Cost Per Unit	Cost/Jerib "Out-of-Pocket" Expenses	Other Expenses	Total Costs Per Jerib
Materials:					
Seed	4.4	49	108	108	216
Fertilizer:					
Commercial	5	40	200		200
Manure	7*	4		28	28
Livestock Feed			160	160	320
Hired Labor	7	44**	308		308
Depreciation			35		35
Miscellaneous:					
Taxes			5	8	13
Interest on Borrowed Capital			25		25
Canal and/or Kariz Repair***			12		12
Other			10	—	10
Total Cost			863	304	1167

*Donkey loads -- One donkey load weighs approximately 130 lbs.

**34 afs plus 2 meals per day.

***Money contribution only -- does not include equipment usage or labor which is accounted for in other categories.

TABLE XVIII

C. FARM CROP PRODUCTION - PERCENT CHANGES IN YIELD AND CROPPING PATTERNS BEFORE AND AFTER TRACTOR PURCHASE ON FARMS OF TRACTOR OWNERS IN SOUTHERN AFGHANISTAN

SOUTH

	Change Due to Tractor Ownership			Change NOT Due to Tractor Ownership		
	Area	Production	Yield	Area	Production	Yield
Irrigated Wheat	+62.0	+28.0	+40.0	-3.6	-1.3	+5.0
Barley	-15.1	+27.5	+50.0	+155.0	+25.0	-51.0
Corn	+301.0	+364.0	+15.5	-4.6	-12.0	-7.9
Cotton	+111.1	+325.0	+100.0	-65.0	-41.0	+66.0
Clover & Alfalfa	--	--	--	-16.0		

On Farm Labor Force:

Table XXIII is a two page table showing labor and animal power requirements before tractor purchase and in 1357. There was a noticeable change in tenancy arrangements from "Ejaradar" (who usually provide bullocks as part of the tenancy agreement) to Deqan who do not provide bullocks and consequently recieve a smaller share of crops. Over-all, [illegible] Ejaradar tenants were displaced by tractors but there was an increase of 63 Deqan tenants for a net of 33 tenants (7.5%) replaced by tractors.

Evidence obtained during interviews shows that the percentage share of Deqan tenants declined, but that actual share was greater because of increased production. This observation is not measurable.

Farm labor requirements increased significantly for full-time laborers. Unfortunately, units do not correspond for the various areas and changes in part-time labor cannot be shown for the overall study. However, it is safe to say that requirements for part-time labor increased more than for full-time.

On Animal Power:

Table XXIII shows the total and average number of bullocks before and after tractor ownership by area. From this it was determined that bullocks replaced per tractor were 3.36 in the north, 2 in the central area, and 7.6 in the south. One exceptionally large operator in the south who reported that forty bullocks were replaced by his tractor was deleted from these calculations leaving an average of eight bullocks per tractor in the south.

Table XIX
Sales of Agricultural Commodities Before and After Tractor Purchase, Average Sales in Seers Per Farm, Number of Farms Reporting, Sales and Percent Change by Crop and Whether Or not Change Was Attributed to Tractor Ownership

	OVERALL			
	Due to Tractor		NOT Due to Tractor	
	No. Farms Reporting	Av. Sales Per Farm (44 Farms)	No. Farms Reporting	Av. Sales Per farm (44 Farms)
Wheat (dryland & Irrigated)				
Before Tractor	14	676	7	906
1347	20	1772	10	1023
% Change		+162		+ 13
Barley				
Before	1	4	1	14
1347	3	69	3	55
% Change		+ ---		+293
Corn				
Before	5	78	2	149
1347	11	298	6	169
% Change		+282		+13
Cotton				
Before	10	307	9	314
1347	10	588	3	141
% Change		+ 92		-55
Clover & Alfalfa				
Before	1	45	1	2
1347	3	82	2	91
% Change		+ 82		+--
Melon & Watermelon				
Before	3	52	3	155
1347	6	395	3	200
% Change		+660		+ 29
Oil Seeds				
Before	3	17	-	--
1347	3	28	-	--
% Change		+ 65		+--
Fruits				
Before	3	95	4	80
1347	3	58	5	178
% Change		-39		+123
Sugar Beets				
Before	-	--	1	2251
1347	-	--	1	579
% Change		--		-74
Mash & Nakhod (mung beans)				
Before	3	19	-	0
1347	4	42	1	.3
% Change		+121		
Others				
Before	3	140	3	39
1347	3	291	3	36
% Change		+108		-3

Table XX
Sales of Agricultural Commodities Before and After Tractor Purchase, Average Sales in Seers per Farm. Number of Farms Reporting Sales and Percent Change by Crop and Whether of Not Change Was Attributed to Tractor Ownership

NORTH

	Due to Tractor: No. Farms Reporting	Due to Tractor: Av. Sales Per Farm (1[illegible] Farms)	Not Due to Tractor: No. Farms Reporting	Not Due to Tractor: Av. Sales Per Farm (1[illegible] Farms)
Wheat (Dryland & Irrigated)				
Before Tractor	3	464	1	71
1347	5	979	5	455
% Change	+[illegible]	+111	+5[illegible]	+541
Barley				
Before	-	--	1	43
1347	-	--	2	129
% Change		--		+200
Corn				
Before	0	0	0	0
1347	1	71	4	143
% Change				
Cotton				
Before	4	679	3	750
1347	4	1250	4	143
% Change		+84		-48
Clover & Alfalfa				
Before	-	--	-	--
1347	-	--	-	--
% Change		--		--
Melon & Watermelon				
Before	0	0	-	--
1347	1	586	-	--
% Change				--
Oil Seeds				
Before	1	43	-	--
1347	1	57	-	--
% Change		+33		--
Fruits				
Before	2	226	1	4
1347	2	93	2	202
% Change		-59		+--
Sugar Beet				
Before	-	--	1	7075
1347	-	---	1	1819
% Change		--		-74
Mash & Nakhod (mung beans)				
Before	1	36	-	--
1347	1	57	-	--
% Change		+58		+--
Others				
Before	1	429	1	107
1347	1	857	1	107
% Change		+100		0

Table XXI
Sales of Agricultural Commodities Before and After Tractor Purchase. Average Sales in Seers per Farm. Number of Farms Reporting Sales and Percent Change by Crop and Whether Or Not Change Was Attributed to Tractor Ownership

	CENTRAL			
	Due to Tractor		NOT due to Tractor	
	No. Farms Reporting	Av. Sales Per Farm (12 Farms)	No. Farms Reporting	Av. Sales Per Farm (12 Farms)
Wheat (Dryland and Irrigated)				
Before Tractor	1	8	3	717
1347	3	144	3	542
% Change		+--		-24
Barley				--
Before	0	0	0	--
1347	1	44	0	--
% Change				--
Corn				
Before	-	--	-	--
1347	-	--	-	--
% Change		--		--
Clover and Alfalfa				--
Before	-	--	-	--
1347	-	--	-	--
% Change		--		--
Cotton				
Before	1	167	1	3
1347	3	300	2	333
% Change		80		4036
Melon and Watermelon				
Before	1	33	2	417
1347	1	167	2	583
% Change		+406		+40
Oil Seeds				
Before	2	12.5	-	--
1347	2	37	-	--
% Change		+196	-	--
Fruits				
Before	-	--	-	--
1347	-	--	-	--
% Change		--		--
Sugar Beets				
Before	-	--	-	--
1347	-	--	-	--
% Change		--		--
Mash and Nakhod (mung beans)				
Before	1	12.5	-	--
1347	1	50	-	--
% Change		+300		--
Others				
Before	1	2	-	--
1347	1	5	-	--
% Change		+150	-	--

Table XXII
Sales of Agricultural Commodities Before and After Tractor Purchase. Average Sales in Seers Per Farm. Number of Farms Reporting Sales and Percent Change by Crop and Whether or Not Change Was Attributed to Tractor Ownership

SOUTH

	Due to Tractor: No. Farms Reporting	Due to Tractor: Av. Sales Per Farm (13 Farms)	Not Due to Tractor: No. Farms Reporting	Not Due to Tractor: Av. Sales Per Farm (13 Farms)
Wheat (Dryland and Irrigated)				
Before Tractor	10	1235	3	1632
1347	12	3473	4	17[illegible]5
% Change		+ 70		+ 6
Barley				
Before	1	10	0	0
1347	2	139	1	35
% Change		+1290		*
Corn				
Before	5	190	2	365
1347	10	674	2	302
% Change		+ 255		- 17
Cotton				
Before	6	224	6	[illegible]
1347	6	464	4	40
% Change		+107		-73
Clover and Alfalfa				
Before	-	----	-	--
1347	-	----	-	--
% Change		----		--
Melon and Watermelon				
Before	2	106	1	100
1347	4	399	1	100
% Change		+276		0
Fruits				
Before	1	56	3	192
1347	1	70	3	273
% Change		+ 25		+45
Sugar Beet				
Before	-	----	-	--
1347	-	----	-	--
% Change		----		--
Mash and Nakhod (mung bean)				
Before	1	10	0	0
1347	2	24	1	1
% Change		+140		+[illegible]
Others				
Before	1	9	2	11
1347	1	42	2	5
% Change		367		-55

Table XX III
Labor and Animal Power Requirements Before and After Tractor Purchase
Totals, Averages, and Percent Changes for Tenants, Laborers and Bullocks

NORTH

	Tenants						Hired Labor						Animal Power		
	Ejaradar(Cashigar)			Deqan(Buzgar)			Full-Time Laborers			Part-Time Laborers			Bullocks		
	N	Total	Average	N	Total	Average	N	Total	Average	N	Total	Average	N	Total	Average
hange Due to ractor Ownership															
Before	5	[illegible]	[illegible]	11	60	[illegible]	3	12	.75	0	0		5	100	7.
1347	5	60	4.3	11	86	6.1	3	22	1.6	1	30	2.14	1	45	3.
Percent Change		-46			+43			+33						-54	
hange NOT Due to ractor Ownership															
Before	1	30	2.1	--	--	--	6	13	.93	7	2766.	197.5	3	20	1.
1347	1	20	1.4	--	--	--	6	12	.85	6	3050.	275	2	4	.2
Percent		-33			--			-3			+39			-80	

CENTRAL

	N	Total	Average	N	Total	Average	N	Total	Average	N	Total	Average	N	Total	Average
hange Due to Tractor Ownership															
Before	--	--	--	8	69	5.75	2	9	.75	4	1505	125.4	5	23	2.2
1347	--	--	--	7	80	6.7	2	15	1.25	4	1973	165	1	[illegible]	.3
Percent Change		--			+16			+67			+31			-35	
hange NOT Due to ractor Ownership															
Before	--	--	--	2	26	2.1	6	28	2.3	2	1400	116.7	3	35	5.
1347	--	--	--	2	26	2.1	6	13	1.5	2	1[illegible]00	[illegible]16.	[illegible]	46	4.
Percent Change		--			0			-36			+21			-23	

Continued from Table XVIII

South

	Tenants						Hired Laborers						Animal Power		
	Ijaradar(Cashgar)			Dogan(Buzgar)			Full-Time Laborers			Part-Time Laborers			Bullocks		
	N	Total	Average	N	Total	Average	N	Total	Average	N	Total	Average	N	Total	Average
Change Due to Tractor Ownership											xxxx	xxx			
Before	[illegible]	[illegible]	3.9	12	119	6.6	10	51	2.[illegible]	[illegible]	--	--	15	250	14.4
1357	5	2[illegible]	1.1	14	150	8.3	12	50	2.3	[illegible]	--	--	3	[illegible]3	[illegible]
Percent Change		-7[illegible]			+26			-2			+72			-[illegible]	
Change NOT Due to Tractor Ownership											xx				
Before	[illegible]	[illegible]	6.2	4	35	1.9	4	8	.4	3	--	--	3	18	1.0
1357	2	[illegible]3	4.6	4	33	2.1	4	15	.3	[illegible]	--	--	1	[illegible]	.3
% Change		-25			+9			+87.5			[illegible].7			-[illegible]7	

Overall

	Tenants						Hired Laborers						Animal Power		
	Ijaradar(Cashgar)			Dogan(Buzgar)			Full-Time Laborers			Part-Time Laborers			Bullocks		
	N	Total	Average	N	Total	Average	N	Total	Average	N	Total	Average	N	Total	Average
Change Due to Tractor Ownership															
Before	[illegible]	1[illegible]1	4.1	31	248	5.6	15	72	1.6	12			23	3[illegible]	[illegible]
1357	1[illegible]	30	1.8	32	316	7.2	17	37	2,0	13			[illegible]	133	3.0
% Change		-[illegible]			27			21						-65	
Change NOT Due to Tractor Ownership															
Before	3	1[illegible]	3.2	6	61	1.4	15	49	1.1	17			14	103	2.3
1357	[illegible]	103	2.3	6	64	1.5	16	45	1.0	15			9	5[illegible]	1.3
% Change		-27			5			-3						-44	

[illegible] N Number of farms reporting any tenants (or hired labor or bullocks)
[illegible] Average per farm total divided by number of respondents ([illegible] in North, 12 in Central, [illegible] in South, [illegible] in overall study.)
[illegible] Man-days of labor
[illegible] Units not comparable; percent is correct.

According to respondants, the major problem of obtaining a tractor falls into the category of "problems in completing security arrangements." Generally, this refers to the red tape, waiting, and other time consuming and costly inconveniences at the local level. Over 30% of respondents who had problems, mentioned this general category.

The only other significant problem was that a 25% down payment was difficult to make, mentioned by 8 percent of the respondents with problems.

The major problem in owning and operating a tractor falls in the category of inadequate parts and repair service. Spare parts seemed to be an even bigger problem than repair services. Owners had to travel long distances to obtain parts and complained of high prices. Major workshops were in Kabul, Kunduz, Mazar-i-Sharif and Kandahar. Many parts were obtained in Pakistan.

Other problems mentioned were: 1) difficulty in obtaining fuel, 2) high taxes, and 3) accidents (one owner reported three accidents which killed three drivers).

Advantages of Tractors:

Major advantages of owning a tractor, in order, as perceived by owners, are as follows:

1. Increases in land productivity.
2. Saves on labor and animal power and does not reduce income of tenants.
3. Allows more land to be cultivated.
4. Allows reduction in number of oxen.

Major disadvantage of owning a tractor, a check question, turned out to be the same as problems of ownership - inadequate parts and repair services. High taxes on tractors were mentioned again.

In answer to "Where did your driver learn to drive?" it was ascertained that most drivers were trained on large development projects - Nangerhar or Helmand. Some learned at various workshops.

When asked "What do farmers in your area need most to improve their farming operation and farm income?" the majority said improved seed and chemical fertilizers. Other significant replies were - more tractors and more irrigation water. The need for agricultural extension assistance and more adequate workshops (for tractors) was also mentioned.

ECONOMICS OF TRACTORS

Costs and Benefits:

Table XXIV shows that average benefits from tractor ownership are about 47,000 afs per tractor per year. Tractors were most profitable in the north, quite economical in the south, but uneconomical in the central area due primarily to their high use in low return dryland wheat farming. Even if returns from custom work are considered, tractors were

Table 6.

COSTS (AFGHANIS) PER JERIB OF PRODUCING
DRYLAND WHEAT
AFGHANISTAN -- 1968

	Units Per Jerib (seers)	Cost Per Unit	Cost/Jerib "Out-of-Pocket" Expenses	Other Expenses	Total Costs Per Jerib
Materials:					
Seed	2	39	28	50	78
Livestock Feed			105	105	210
Hired Labor	4 (man days)	44*	176		176
Depreciation			18		18
Miscellaneous:					
Taxes				3	3
Interest on Borrowed Capital			13		13
Other			5	___	5
Total Cost			345	158	503

*34 afs plus 2 meals per day.

a losing proposition in the central area.

Table XXIV

COSTS AND RETURNS FROM TRACTOR OWNERSHIP

	NORTH Afs/year	CENTRAL Afs/year	SOUTH Afs/year	OVERALL Afs/year
Cost:				
Operating Expenses	64,637	71.444	92,365	77,337
Depreciation	27,000	42,000	42,000	37.227
Total	91,637	113,444	134,365	115,064
Returns:				
Benefits from Extra Production	197,107	10,700	166,513	133,753
Saving on Oxen Maintenance	19.724	10.220	40,830	25,737
Depreciation	1,930	1,000	4,000	2,523
Total	218,761	21,920	211,393	162,063
Returns Less Cost	+127,124	-91,524	+77,028	+46,999

Table III shows average use for custom work to be 15.7 days per year. If tractors are paid for ten hours per day for 15.7 days of custom work per year, they will earn about 24,000 afs per year at the average rate of 153 afs per hour shown in Table IV.

When custom work earnings are considered, benefits from tractor ownership should be valued at 145,947 afs per year in the north, 35,023 in the south, and a loss of 67,503 in the central area.

The poor showing of tractors in the central area is partially explained by the fact that they are used a great deal on dryland wheat -- a rather uncertain and low yielding enterprise. See Table VIII which shows that on average over 70 percent of the land on which tractor was used was planted to dryland wheat (539 jeribs of dryland wheat out of a total

of 761 jeribs). Clover and alfalfa cultivation was also important in the central area, and this is not usually a good money crop in Afghanistan. Enumerator observation in the central area is that tractors are frequently used on widely separated fields. Table II shows that average monthly tractor use is excessively high (182.6 hours per month equals over 2,000 hours per year - 1200 hours per year is considered high in the U. S.).

For Table XXIV, the following prices were used to calculate benefits from changes in production.

Wheat	30 afs per seer	Melons	6 afs per seer
Barley	12 afs per seer	Oil Seeds	38 afs per seer
Corn	15 afs per seer	Fruits	20 afs per seer
Cotton	50 afs per seer	Mung Beans	40 afs per seer
Clover	3 afs per seer	Others	10 afs per seer

These prices are approximations made from prices during 1345 and 1346 obtained from the Kabul Weekly Retail Price Report (USAID/Agriculture Division) and adjusted for farm price, mostly on the basis of the author's experience. Information from <u>The Place of Cotton and Beet Sugar in the Economy of Afghanistan</u> by Allanson and <u>The Cotton Supply Response to Price Changes</u> by Keshawarz and Saunders (Ministry of Planning) was also used.

Costs of maintenance per oxen were 14 afs per day in all areas. This is based on information from a study of <u>Costs and Returns for Wheat Production</u> done by Dawlaty, Saleh and Owens. Oxen depreciation was taken from the same source.

SUMMARY AND CONCLUSIONS

Generally speaking, tractor ownership is practical on larger farms capable of intensive cultivation. Additional imports of tractors and implements, if properly placed and used, will be important to agricultural development in Afghanistan.

Tractor use, in terms of hours per month or hours per year, is high in Afghanistan, especially in the central area. Tractor use is spread fairly evenly throughout the spring, summer and fall months except in the south where most of the work is during the fall months. Tractors are used least in the winter, as would be expected.

Plowing is the most important tractor operation in terms of hours used, with hauling second. In view of the high number of hours tractors are used, there is some question as to whether hauling is the second best use for tractors.

In the over-all study, tractors are used on more jeribs of wheat than jeribs of all other crops -- almost 75 percent of the acreage on which tractors were used was wheat land. About 41 percent of this wheatland was dryland acreage, which usually gives poor returns. Almost 90 percent of all dryland acreage was in the central area.

The most used implements, according to operators, are the plow and field cultivator or tiller (the tiller was not part of the implement package for Byelarus tractors).

Least used implements are the blade and disc harrow. Farmers showed a great deal of interest in threshing machines, grain drills and ridger-ditcher attachments when asked what implements they would like to buy. A stationary threshing machine which could be powered by the tractor can probably be obtained at a reasonable price from Pakistan. Threshing machines would replace a great deal of labor, the wisdom of which has been questioned in Afghanistan. Although no measures of unemployment and underemployment exist, they are certainly problems. On the other hand, labor shortage at harvest time is also a serious problem in many areas.

Tractor owners are generally optimistic regarding useful life of tractors. Most of the tractors in this study will not be useful after ten years of life.

Costs of operating tractors, as reported in this study, are low compared to costs in the U. S. A. for comparable tractors. This is especially true for the north and central areas. This is probably partly due to under reporting of costs, partly to inadequate maintenance and partly to lower fuel and labor costs.

Major problems, according to tractor owners themselves, were encountered in: 1) completing security arrangements for the bank before taking delivery of tractor and 2) obtaining spare parts. The major advantages were: 1) increased land productivity and 2) savings of labor and animal power. Improved seed and fertilizer were seen as the greatest need for improvements in farming.

Significant increases in production and sales were attributed to the tractors in the north and south. Value of additional production was about 127,000 afs per year in the north and 77,000 afs per year in the south.

On the balance, very little if any human labor was replaced by tractors. There was a noticeable shift from "Ejaradar", who usually provide oxen as part of the tenancy agreement, to "Deqan" who are more on the order of full-time laborers. Tractors replaced an average of 3.8 bullocks per tractor in the notth, 2 in the central area, and 8 in the south. This amounts to an average of 5.8 bullocks per tractor for the overall study.

Tractors were very economical in the north, economical in the south, and uneconomical in the central area where tractors were used heavily in low return dryland wheat production. Generally speaking the north is the most productive area with reference to water availability, climate and soils, and the central area is least productive. In addition, the tractors in the north have been in use longer. It is unlikely that tractors will ever be economical for dryland wheat farming in Afghanistan.

This study points out several things which should be considered seriously in determining agricultural future policy.

1. Some attempt should be made to provide better information to tractor owners and tractor drivers regarding proper and best use of their machines and implements. Apparently, many tractors do not receive proper maintenance.

Perhaps this could be done with information bulletins prepared in cooperation with the new workshop-school on the Ministry of Agriculture Daralaman Farm.

2. Assistance in improving parts availability and repair service is a strongly felt need on the part of the farmer. Means should be sought by which this can be dor); perhaps through encouraging private enterprise.

3. Consideration should be given to a revised implement package -- certain items such as disc and scraper should be optional and other items should be available if the operator wishes to purchase them.

4. Tractor purchase by dryland wheat farmers should be discouraged and care should be taken to place tractors on land which can be more intensively cultivated.

5. An equ table policy for determining who receives t tractors should be devised on the basis of type of farm, size of farm and location as well as operator's ability to pay. Red tape and other inconveniences should be reduced as much as possible, especially at the local administrative level. Current prices and interest rates seem reasonable, but ways of reducing costs to farmers are desireable.

WATER PUMPS

Twenty-seven water pump owners were interviewed who owned a total of forty-eight water pumps -- 1.78 pumps per farm. Some of the pump owners were reporting for their partners, so the concept of 1.78 pumps per farm is somewhat inexact. Thirteen sole proprietors reported owning a total of twenty-four pumps. The remaining twenty-four pumps were owned by 196 persons, some of whom owned as small as one-sixteenth share.

Most of the pumps were made in Pakistan; four were from the Soviet Union, two from Czechoslovakia and one from Japan. Twenty-four of the forty-one Pakistani pumps were of the Beco 20 HP type. Only nine of the forty-eight pumps were "portable"; the rest were stationary. Table XXV gives details of pump types. All pumps were powered by diesel motors.

Only the Beco 20 HP, Beco 7½ HP and Soviet 14 HP pumps were imported by the Bank. There were twenty-eight such pumps in this study; the other twenty pumps had been imported privately.

Eight of the forty-eight pumps were not operating for want of a well or repairs.

Utilization:

The Beco pumps were operated an average of 110 days per year and all pumps in the study averaged 93.4 days operation per year. Average hours of operation by season, for all pumps, ranged from 9.2 yours per day in the spring to

11.5 hours in the summer to 16.0 hours per day in the fall (See Table XXVL)/ Peak water use in Afghanistan is generally in the spring and summer. The reason for the more intensive pump use during the fall is that traditional water sources are prone to dry up as the seasons progress. None of the pumps were used during the winter.

Table XXVII shows that pumps were used primarily to irrigate wheat, which is usually irrigated before and after planting in the fall. Types of crops irrigated by water pumps correspond closely to types of crops on which tractors were used in the central area except in the case of dryland wheat, which is excluded from the pump study by definition.

None of the pump owners in this study sold water to other farmers or landowners (except their own tenents.)

Costs:

Pumps were sold on the same terms as tractors for the following prices.

Beco 20 HP	83,955 afs
Beco 7½ HP	54,541 afs
Soviet 14 HP	43,081 afs

Prices of pumps not imported by the Bank are not known.

As with tractors, pump owners tended to be overly optimistic regarding useful life and salvage value of pumps.

Calculations in this study were based on a salvage value of 10 percent at original cost and 10 years of useful life.

Table XXVIII shows costs for three horsepower categories of pumps and average yearly costs for all pumps. The figures show that operating costs were higher for 13-16 HP pumps than for 18-20 HP pumps. However, the depreciation is much lower when the price for the Soviet 14 HP pump is used.

Average operating expenses are about thirty afs per hour per pump for all pumps. By horsepower category, they are:

18-20	26.6
13-16	34,1
7½-10	25.3

According to these figures, the 18-20 pumps, particularly the Beco 20, are most economical. This is corroborated by the fact that half the pumps in the study are Beco 20's and most operators prefer Beco 20's or similar pumps if they intend or want to buy another pump.

Costs of well, including pipe and installation, were a very large item, averaging almost 50,000 afs per well. Most of the wells were dug by the owners with the help of hired labor (19 of 36 reporting). Twelve of thirty-six owners dug the wells themselves (probably cooperative projects among multiple ownership pumps) and 5 of 36 were dug exclusively by hired labor. Thirty-three of thirty-eight wells were hand dug to an average depth of 14.56 meters. The remaining fifteen were hand dug to an average depth of 14.3 meters and then extended

Table XXV - Number and Types of Water Pumps in Study

Brand Name	Country of Manufacture	Number of Pumps in Study by Horsepower Rating								Total Number in Study	Number	
		20	13	16	15	14	13	10	7.5		Portable	Fixed
Beco	Pakistan	24	[illegible]	1		[illegible]	1	[illegible]	3.	28	4	24
Atifaq	Pakistan			4						4		4
Badder	Pakistan		1		1	1				3		3
Matchless	Pakistan	3	1							4		4
Nessar	Pakistan					1				1		1
Hussain	Pakistan		1							1		1
?	Soviet Union				1		3			4	4	
?	Japan							1		1		1
?	Czechoslovakia			2						2	1	1
All Pumps		27	3	7	2	2	3	1	3	48	9	39

Table 7.

LIVESTOCK FEED COSTS (AFGHANIS):
225 FARMS IN AFGHANISTAN -- 1968

	Av. Feed Cost Per Head		Av. No. Animals Per Farm	Av. Feed Cost Per Year Per Farm	Av. Feed Cost Per Year Per Jerib
	Year	Day			
Oxen	6387	17.5	2.2	13,733	231
Horse	3394	9.3	.3	1,154	19
Camel	3832	10.5	.1	460	8
Donkey	2226	6.1	1.5	3,273	55
Total	15,839	43.4		18,620	313

Table 8.

LABOR REQUIREMENTS FOR PRODUCING
IRRIGATED-TRADITIONAL WHEAT ON
225 FARMS IN AFGHANISTAN -- 1968

	Man-Days Per Jerib		
	Family Labor	Hired Labor	Total
Plowing and Planting	1.9	1.1	3.0
Fertilizer Application:			
Chemical	(.03)	(.01)	(.04)
Organic	1.3	1.0	2.3
Irrigation	.7	.5	1.2
Harvesting	1.1	1.3	2.4
Threshing	2.0	1.5	3.5
Topping*	.1		.1
Transporting Produce	1.1	.7	1.8
Total	8.2	6.1	14.3

*Wheat is frequently "topped" (leafy parts cut) in the early stages of plant growth to provide feed for livestock.

Table XXVI

WATER PUMP OPERATION -- DAYS OPERATED PER YEAR AND HOURS PER DAY BY SEASON, BY TYPE OF PUMP

		Days Per Year Of Operation		Average Hours Per Day Of Operation			
		Av.	Range	Spring	Summer	Fall	Winter*
Beco	Pakistan	110	20-235	10.5	10.6	14.3	0
Atifaq	Pakistan	135	90-180	18.2	23.0	18.2	0
Badder	Pakistan	115	105-120	13.6	8.0	17.3	0
Matchless	Pakistan	126	80-180	23.0	12.0	23.0	0
Nessar	Pakistan	80		23.0-		23.0	0
Hussain	Pakistan	135		22.0		22.0	0
	Soviet Union	75	30-120	2.0	12.0	11.3	0
	Japan	135		22.0		22.0	0
	Czechoslovakia	98	90-150	6.0	23.0	14.5	0
All Pumps		93.4		9.2	11.5	16.0	

* None of the pumps were operated during the winter.

TABLE XXVII -- JERIBS OF VARIOUS CROPS IRRIGATED BY WATER PUMP (1347).

Crop	N	Total Jeribs	Av. Jeribs/Farm	Av. Jeribs/Pump
Wheat	26	3,576	132.4	74.5
Alfalfa & Clover	13	472	17.5	9.8
Melons	6	77	2.9	1.6
Corn & Barley	7	109.5	4.1	2.3
Vegetables	3	9	.3	.2
Others	6	278	10.3	5.8

N Number of farms reporting
Average jeribs per farm = total jeribs ÷ 27

Average jeribs per pump = total jeribs ÷ 48

Table XXVIII -- Costs of Operation - Pumps

	18-20 HP			13-16 HP			7-10 HP		
	Afs Hour	Afs Month	Total Afs Year	Afs Hour	Afs Month	Total Afs Year	Afs Hour	Afs Month	Total Afs Year
Fuel	12.7		16,764	13.2		16,027	10.7		13,[illegible]53
Oil	2.63		3.469	4.26		5,170	4.0		[illegible],350
Grease			366			206			113
Salary		786.7	9,440		1028.6	12,243		770.0	9,240
Repairs			2,171			4,703			1,250
Total Operating Costs			32,210			38,454			2[illegible],511

(Cont.)

	All Pumps Afs Per Year
Fuel	
Oil	
Grease	
Salary	
Repairs	
Total Operating Costs	33,723

12.7 more meters (total depth 27 meters) by mechanical spudding or sinking iron tubing. Wells are usually round 3-4 meters in diameter with a rectangular or square shelf 3x4 to 4x5 meters, where the pump is placed about half-way down. A ramp is usually dug down to the pump beginning about 18-30 meters from the well site.

Tube wells of comparable depth would probably cost considerably less if drilled with modern machinery.

Effects of Pumps:

(On Area Planted Annually);

Apparently, water pump owners increased their acreage of all crops because of pump ownership. In most cases, production also increased, but yields decreased on all crops except vegetables. See Table XXIX. This indicates that the expected (or hoped for) amount of water was not forthcoming -- over-optimism again. Some operators did not get enough water because the well was inadequate and some pumps were inoperable for lack of repairs. Another factor causing low yield per jerib is the new non-previously-cultivated land brought under irrigation by water pump. Those lands are usually poor physically and low in organic matter. Twenty-four of the twenty-seven owners said irrigation water was inadequate for their land and fourteen of the twenty-four attributed this shortage to inadequate water from their well.

(On Crop Production And Yields;)

The 243.3 percent increase in wheat production alone represents a value (of increased production) of over 23,000 afs

per year per pump. Net value of increases and decreases in production, 28,806 afs per pump per year, is shown in the section on Economics of Pump Utilization. See Table XXXIII.

(On Sales of Farm Products;)

Sales of the following commodities increased, and most of the increases were attributed to tractor ownership:

Wheat	Melons
Corn	Alfalfa and Clover
Legume Crops	Oilseeds
Vegetables	Tobacco

There were no decreases in sales. Value of the increased sales which were attributed to pump ownership was about 7,800 afs per year per pump of 13,900 afs per year per farm, about 27 percent the value of increased production. This is shown in Table XXX.

Table XXXI shows that jeribs irrigated almost quadrupled after pump purchase, according to operators definition. Jeribs planted more than doubled. Jeribs of owned dryland declined by about 45 percent but jeribs fallowed increased greatly. Operators probably classify this as "irrigable" land for which there wasn't sufficient water. Virtually all changes in land use shown in Table XXXI were attributed to pump ownership.

(On Farm Labor Force;)

Table XXXII shows that all categories of tenants, laborers and bullocks increased when change was attributed to pump ownership. This change was most apparent in the Deqan tenant category. There were no ejaradar tenants.

Table XXIX

Farm Crop Production - Total Area Planted and Yield, Before Pump Purchase and in 1347

	DUE TO WATER PUMP					NOT DUE TO WATER PUMP				
	N	Jeribs	N	Seers	Yield	N	Jeribs	N	Seers	Yield
Wheat										
Before	14	784	14	16680	21.3	4	635	4	15900	25.0
1347	19	3988	19	57260	14.4	5	542	5	15705	29.0
% Change		+408.7		+243.3	-32.4		-14.6		-1.2	+16.0
Dryland Wheat										
Before	2	720	2	3500	4.9	7	892	7	3150	3.5
1347	2	8000	2	2140	2.7	5	1068	6	685	.6
% Change		+11.1		-38.9	-44.9		+19.7		-78.3	-82.9
Alfalfa & Clover										
Before	5	47	5	3210	68.3	4	225	4	2530	114.7
1347	8	467	8	9885	21.2	2	115	2	1600	139.1
% Change		+893.6		+207.9	-69.0		-48.9		-38.0	+23.3
Melons										
Before	1	2	1	1000	500.0	1	8	1	5000	600.0
1347	5	79	5	11600	146.3	1	5	1	2000	400.0
% Change		+3350.0		+106.0	-70.6		-37.5		-60.0	-36.0
Corn & Barley										
Before	1	9	1	580	64.4	1	10	1	800	80.0
1347	4	33.5	4	2580	30.9	2	37	2	1460	39.5
% Change		+327.8		+344.8	-52.0		+270		+82.5	+50.6
Vegetables										
Before	2	4.25	2	450	105.9	-	-			
1347	5	18.5	5	2340	126.5	1	.5	1	50	100
% change		3335.3		+420.0	+19.5					
Other Legumes										
Before	2	39	2	570	14.6					
1347	2	270	2	1900	7.0					
% Change		+592.3		+233.3	-52.1					
Others										
Before	1	1	1	40	40.0					
1347	1	4	1	160	40.0					
% Change		+300.0		+300.0	0					

Table XXX

Sales of Agricultural Products Before and After Pump Purchase
Average Sales Per Farm. Number of Farms Reporting Sales.
Percent Change and Whether or Not Change was Due to Pump
Ownership

	Due To Pump		Not Due To Pump	
	No. Farms Reporting	Av. Sales/ Farm (seers)	No. Farms Reporting	Av. Sales/ Farm(seers
Wheat Dryland & Irrigated				
Before	3	11.11	1	148
1347	8	300	2	166.7
Percent Change		+2600		+13
Barley				
Before	0	0	1	18.5
1347	0	0	1	3.7
Percent Change		0		-80
Cotton				
Before	0	0	0	0
1347	0	0	0	0
Percent Change		0		0
Corn				
Before	0	0	0	0
1347	4	+75.9	0	0
Percent Change				
Legume Crops				
Before	2	5.6	0	0
1347	2	26.0	0	0
Percent Change		+364		0
Vegetables				
Before	1	5.2	1	22.2
1347	2	51.2	1	22.2
Percent Change		+884		0
Melons				
Befre	1	14.8	0	0
1347	2	148.1	0	0
Percent Change		+900.0		0
Alfalfa & Clover				
Before	0	0	0	0
1347	2	+75	0	0
Percent Change				
Fruit				
Before	0	0	1	17.3
1347	0	0	1	17.3
Percent Change		0		0
Oil Seeds				
Before	2	7	0	0
1347	2	27.8	0	0
Percent Change		+297.		0
Tobacco				
Before	1	.74	0	0
1347	1	2.2	0	0
Percent Change		+197		0

Table XXXI

Total Jeribs Irrigated, Total Jeribs Dryland, Total Jeribs Planted, and Total Jeribs Fallowed on Farms of 27 Water Pump Owners

	Before Pump N	Before Pump Total	1347 N	1347 Total
Jeribs Irrigated Owned Rented	20	5627	26	21921
Jeribs Dryland Owned Rented	14	7123	11	3799
Jeribs Planted Owned Rented	23	3471	27	9301
Jeribs Fallowed Owned Rented	13	961	16	3030

N = Number of farms reporting

Table XXXII

Labor and Animal Power Requirements on Farms of Water Pump Owners

	Degan[x]			Full-Time Laborers[x]			Part-Tm. Laborers[xx]			Bullocks[x]		
	N	Total	Average Per Farm	N	Total	Average Per Farm	N	Total	Average Per Farm	N	Total	Average Per Farm
Due to Pump Ownership												
Before	6	21	.8	1	3	.1	2	740	27.4	6	44	1.6
1347	12	142	5.3	3	17	.6	5	2435	90.2	8	73	2.9
Percent Change		+576.2			+466.7			+229.1			+77.3	
Not Due to Pump Ownership												
Before	8	44	1.6	5	19	.7	2	1040	38.5	14	88	3.3
1347	11	96	3.6	7	18	.7	8	2040	75.6	15	164	6.1
Percent Change		+118.2			- .05			+96.2			+86.4	

x Number of workers or animals per year

xx Man-Days per year

N Number of farms reporting

Average per farm = Total ÷ 27

Farmer's Attitudes, Opinions and Problems:

(Problems of Pump Ownership;)

Eleven of thirteen pump owners who reported problems in obtaining their pumps listed difficulty "in completing security arrangements" which may be defined the same as for tractor owners -- red tape, waiting, and "other costly and time consuming factors".

Major problems in operating the pumps were shortage of spare parts and inadequate repair service. Land dispute problems and disagreement among owners were mentioned and "well not deep enough".

(Advantages of Motor Pumps:)

The major advantage of owning a water pump was reported to be "adds new land to previous holdings" (20 of 27 replies). Seven operators reported that "it increases production". The major disadvantage was reported as difficulty in obtaining parts and repair service.

Pump owners were asked what farmers needed most to improve their farming operations and farm income. The significant replies, in order of importance, were:

1. Workshops and mechanics
2. More water for irrigation
3. Spare parts for farm equipment
4. Drilling machinery to increase water supply
5. Tractors

The also mentioned need for improved seeds, fertilizer, fuel stations, fruit trees and assistance in constructing wells.

Economics of Motor Pumps:
(Costs and Benefits;)

From the standpoint of our analysis, water pumps are not economical in the study area. Table XXXIII shows a net annual loss per farm of over 28,000 afs. While this analaysis does not take account of the costs of traditional water <u>saved</u> by pumps, neither does it take account of the extra costs occasioned by an increase in labor and animal power. These are unknown on unassignable quantities, but would tend to counterbalance each other.

There are, however, other considerations. The quantity of ground water for wells and pumps is not known -- how many wells and pumps will this water supply support and for how long. Regardless of costs and returns, this information must be obtained before decisions can be made regarding future pump use in this area.

Assuming the water supply is adequate for a given number of pumps for a reasonable period of time -- say forever -- a strong case for pumps may still be made for two reasons:

1. Reclaimed land will undoubtedly increase in value -- probably enough to offset the costs of pumps and initial decreases in yeilds.

2. The efficiency of farming on reclaimed land will probably improve with time. Much of the new land currently in use is only partially developed. When asked about plans

The harvesting and threshing operation(s) require more labor than any other. There are very few combines or threshing machines in Afghanistan and most, if not all of these, are on institutional farms.

Wheat is cut with a hand sickle and brought to a threshing floor in bundles. Oxen are driven over the wheat to separate grain from the straw and chaff. Later, the grain is winnowed, sifted and hand-cleaned in a wicker scoop by a shuffling action.

Plowing and planting is the next most labor-consuming operation. This usually takes place in autumn. Land is stirred (not turned) one or more times by a stick plow pulled by a yoke of oxen. Clods are sometimes broken up with a locally made harrow. Seeds are sown by hand and covered by pulling a "mallah" or wooden drag over the sown land. There are only about 400 privately owned tractors in Afghanistan.

Manure application is the third most labor consuming operation. This involves loading donkeys, or sometimes carts, at the barnyard or from some other source, driving them to the wheat field, unloading, and spreading the fertilizer by shovel. Table 8 shows labor requirements for growing irrigated-traditional wheat. In this case, an insignificant amount of labor is used on chemical fertilizer. For irrigated-improved wheat, the total amount of labor for fertilizing would be less because of less bulk to handle, but total labor requirements are higher because farmers take better care of the crop and have more wheat to harvest and thresh.

Improved wheat varieties have shorter straw, and grain is easier to separate from the straw than the local varieties. Hence, labor costs per seer are less than for traditional varieties. However, since the yield for improved varieties is almost double that of traditional varieties, slightly more total labor is required.

Note that family labor accounts for more than half of total labor. Hired labor is proportionately lower on smaller farms. The bulk of hired labor is used for harvesting and threshing operations and is usually paid in kind.

Table 9 is a straight-line schedule for depreciable livestock and equipment. Average costs, salvage values, and workable life are shown with calculations of yearly depreciation and depreciation costs per jerib. The most costly and numerous work animal is the ox and next is the donkey. Oxen, according to this study, are slightly more expensive than camels, and also more costly to feed. The oxen are also more useful; indispensable on most farms.

TAXES

There is a moderate tax on land in Afghanistan which is usually paid by the landowner. Since most of the farmers in this study were tenants, the bulk of taxes are classified as other expenses.

for improving their farm operations, 17 of the 27 respondents said they had definite plans to use improved seed (wheat seed) and were able to tell us how many seers they planned to use. Ten of these people also planned to use chemical fertilizer. Thirteen respondents were using or planned to use insecticides for specific purposes which they were able to state.

Table XXXIV is a distribution of farm size and jeribs planted. Unlike the situation for tractors, pumps are not necessarily most economical on larger acreage. Expert opinion is needed on amounts of water needed per jerib of various crops and how much water the various pumps can supply.

Summary and Conclusions:

The Bec0 20 HP pump or its equilavent in other brands seems to be the most popular and most economical.

Peak pump use is in the fall and the water is used mostly for wheat. None of the pumps are used to supply water to persons other than the owners.

Costs of pump operation average over 33,700 afs per year of about 30 afs per hour. No basis of comparison was available to the authors. Costs of digging wells (which are probably not deep enough even at 100 feet) were found to be about 47,500 afs which is probably excessive.

As a result of pump ownership, area planted generally went up and production increased somewhat less, causing a decline in yields. Net value of changes in production amount-

ed to about 28,806 afs per pump per year, about one-fourth of which was sold. Most of the increases in production and sales were from wheat.

Jeribs irrigated almost quadripled, jeribs planted more than doubled, owned dryland acreage declined and jeribs fallowed increased.

All categories of tenents, laborers, and animal power increased, particularly tenants.

Farmers major problems were completing security arrangements and inadequate parts and repair service.

Major advantage was seen to be that the pumps add to landholdings and that pumps increase total production (but not productivity).

Farmer's most pressing needs seemed to be workshops and mechanics, additional irrigation water, and spare parts.

Pump irrigation was not economical in the study area but this may be mitigated by the facts that production will probably increase in a few years after the land is fully developed and that the value of reclaimed land will probably increase. At present farmers lack experience with pump irrigation and have tried to utilize more land than the pumps will supply water for. Farmers should be encouraged to use pump irrigation on high value crops. It has been repeatedly shown in other countries that pump irrigation is economically unfeasible on low value crops.

Table XXXIII

Costs and Returns from Pump Ownership

	18-20 HP	13-16 HP	7½-10 HP	All Pumps
Costs				
Operating expenses	32,210	38,455	28.511	33,723
Depreciation:				
pumps - 10 yrs.	10,000	6,000	6,500	8,541
well, etc. 10 yrs.	5,430	5,233	1.428	4,749
20 yrs.	2,715	2,119	714	2,374
Total Cost - per pump				
Well life - 10 yrs.	47,640	49,693	36,439	47,013
Well life - 20 yrs.	44,925	46,574	35,809	44,638
Total cost - per farm				
Well life - 10 yrs.	84,704	88,354	64,361	83,539
Well life - 20 yrs.	79,877	82,809	63,519	79,366
Returns from extra Production - per pump				28,806
per farm				51.210
Returns less cost - afs/farm				
Well life - 10 yrs.				-32,379
Well life - 20 yrs.				-28,156

Table XXXIV

Land Use Distribution - Farms of Water Pump Owners

Total jeribs planted:

	Before	1347
0	4	0
1 - 9	0	0
10 - 19	1	1
20 - 39	6	1
40 - 69	5	3
70 - 99	1	4
100 - 199	4	2
200 - 299	2	5
300 - 399	0	3
400 - 499	2	0
500 - 599	1	1
600 - 699	1	3
700 - 999	0	3
1000 - 1499	0	
1500 +		1

Total jeribs in farm:

	Before	1347
0	0	0
1 - 9	0	0
10 - 19	0	0
20 - 39	4	0
40 - 69	2	1
70 - 99	1	2
100 - 199	2	1
200 - 299	2	1
300 - 399	2	4
400 - 499	4	4
500 - 598	3	3
600 - 699	1	2
700 - 999	0	1
1000 - 1499	1	4
1500 - 1999	1	2
2000 - 2499	1	0
2500 +	1	3

Before decisions regarding importation of pumps can be made, information about the ground water supply must be obtained.

Farmers need assistance (public of private?) in drilling wells (if the water supply is adequate for more wells.)

Care must be taken in selling pumps not to oppose land reclamation and resettlement policies. The value of multiple ownership should be studied more carefully.

Although not shown clearly by this study, pumps used for supplemental irrigation from sources other than wells are quite possibly economical, especially if they can supply water on a more timely basis.

Parts and repair service is a critical need, as for tractors.

Competent agricultural and engineering advice should be sought regarding pump performance and irrigation water needs of various crops.

Table 9.

DEPRECIATION* OF LIVESTOCK AND EQUIPMENT (AFGHANIS):
225 FARMS IN AFGHANISTAN -- 1968

	Av. Cost Per Head	Av. Salvage Value	Work Life (Years)	Depreciation/ Head/Year	Av. No. Per Farm	Av. Depr. Per Year Per Jerib	
							Total
Oxen	4910	1751	9	351	2.2	12.7	
Horse	3162	357	12	234	.3	1.3	
Camel	4611	1278	15	222	.1	.5	
Donkey	1097	0	8	137	1.5	3.4	17.9
Plow	150	6	2	72	.3	2.5	
Other Equip.**	5000	0				12.9	15.4
Total	18,930	3,392					33.3

*Straight-line method.

**Donkey saddles, carts, shovels, sickles, mallah (harrow), grain bags, straw nets, chains, ropes, etc. (estimated).

RELATIONSHIP OF STUDY DATA TO RECOMMENDED PRACTICES

It is interesting to speculate on the cost and return situation if farmers had followed the advice of the Ministry of Agriculture and Irrigation. Table 10 shows costs, including recommended amounts of fertilizer, and returns at a slightly higher yield. Preliminary evidence from research indicates that higher rates of fertilization would be even more profitable.

ALLOCATION OF FARM WHEAT PRODUCTION

Half of all wheat produced on farms in this study was used for home consumption. If the assumption that farms in this study are above average in size and efficiency is correct, we can safely assume that more than half of Afghanistan's wheat production is for home consumption. Table 11 shows percentages of wheat used for various purposes.

Only nineteen percent of production was sold from farms in this study and actual sales may be even lower for the country as a whole. However, some of the wheat used as payment in kind and a significant amount of wheat used for loan repayment eventually goes through marketing channels, which may handle as much as 25 or 30 percent of the total wheat crop in Afghanistan. Some seed goes through marketing channels and some wastage occurs during marketing.

TENURE CLASSIFICATION OF RESPONDENTS

Table 12 shows tenure classification for the 225 farms surveyed. Sharecroppers are by far the most numerous group, followed by full-owners. Details of the landlord-tenant relationship were not investigated in this study, but they are known to be quite diverse from results of other studies. Share arrangements depend primarily on the relative contributions of labor, seed, equipment, water, size of farm, and animal power by landlord and tenant. Land productivity, kinship, cropping patterns and other considerations may also affect the share arrangements.

In this study, a significant amount of information on tenants' farms was supplied by their landlords. In Afghanistan, it is common for the landlord to be more knowledgeable, especially in the case of tenants whose contribution is very little more than their own labor. Furthermore, many tenants are reluctant to provide information except in the presence of their landlords.

The above tenure information cannot be considered characteristic of Afghanistan as a whole. Tenure patterns for the entire country are not available either through complete census or extensive sampling.

RECOMMENDATIONS FOR FURTHER RESEARCH

Additional economics studies of costs and returns must be made to cover the whole country. In the future, these should be done in more detail, and more attention should be paid to allocating general costs to the various enterprises.

Table 10.

HYPOTHETICAL COSTS AND RETURNS (AFGHANIS) FOR PRODUCING WHEAT ACCORDING TO RECOMMENDED PRACTICES -- AFGHANISTAN

	Units Per Jerib (seers)	Cost Per Unit	Cost Per Jerib "Out-of-Pocket" Expenses	Cost Per Jerib Other Expense	Total Cost Per Jerib
Materials:					
Seed	4.5	49	110	110	220
Chemical Fertilizer	4.0 urea	35	140		140
	6 super p	15	90		90
Livestock Feed			160	160	320
Hired Labor	7 (days)	44	308		308
Depreciation			35		35
Miscellaneous:					
Taxes			5	8	13
Interest on Borrowed Capital			25		25
Canal and/or Kariz Repair			12		12
Other			10	—	10
Total Cost			895	278	1173

RETURNS:

Wheat	60 seers @ 38 afs/seer*	2280
Straw		125
Total Receipts		2405
Less out-of-pocket expenses		895
		1510
Less other expenses		278
Returns to family labor, mgmt., and interest on investment		1232

*Results from demonstrations conducted on farmers' land indicate that 60 seers per jerib is a reasonable yield with improved seed, recommended fertilizer application and traditional cultural practices.

Table 11.

ALLOCATION OF WHEAT PRODUCTION:
225 FARMS IN AFGHANISTAN -- 1968

	Percent of Total Production
Home Consumption	50
Sales	19
Seed (for coming year)	12
Payment in Kind	9
Waste	8
Loan Repayment	2
	100

Table 12.

TENURE CLASSIFICATION OF:
225 WHEAT FARMS IN AFGHANISTAN -- 1968

	Number of Farms	Percent
Full-owner Operators	61	27
Part-owner Operators	39	17
Crop-share Tenants	105	47
Renters	17	8
Combination Renter-Sharecropper	3	1
	225	100

Note: Landlords (owner-non-operators) supplied information for approximately 54 percent of the tenants and renters.

An even greater need is a series of studies to determine optimum fertilizer levels in various geographical areas. The research should be designed and carried out with sufficient precision to permit marginal analysis at various alternative costs for seed and fertilizer.

There is, or soon will be, a strong need for research in wheat marketing and processing. Atomism and lack of marketing information have already been observed in both the markets for agricultural inputs and outputs. Research will be necessary to guide market development, which must keep pace with agricultural technology if the overall economy is to maintain a balanced growth.

خلاصه موضوع

این رساله محتوی مطالب و معلومات مفصل اقتصادی در قسمت تولید گندم در فی جریب زمین میباشد . اساس معلومات را یک سروی اقتصادی مزارع گندم در شش ولایات شمالی . مرکزی و شرقی که در زمستان سال ۱۳٤۷ توسط شعبه اقتصاد زراعتی پوهنحی زراعت صورت گرفته تشکیل میدهد .

از جمله نتائیج مهم این مطالعه مقایسه مصارف و عواید سه نوع گندم یعنی گندم ابی وطنی ـ گندم ابی اصلاح شده و گندم للمی وطنی میباشد (این مقایسه در جدول دوم خلص گردیده است) .

گندم للمی نسبت خشک سالی حاصل خوب نداده عاید کار فامیل و سرمایه از فی جریب / ۸۲ ـ / افغانی بود .

گندم ابی وطنی حاصل نسبتاً خوب داده عاید کار فامیل و سرمایه (۲۲۰) افغانی از فی جریب بود .

گندم ابی اصلاح شده که با کود کمیاوی کاشته شده بود با وجود اینکه دهاقین تجارب کافی بدست نداشتند ـ عاید کار فامیل و سرمایه از فی جریب (۹۱۵) افغانی بود .

توضیحات بیشتر راجع به تولید و مصرف فی جریب هر یک از سه نوع گندم فوق در جداول شامل رساله تشریح گردیده است .

همچنان نتیجه این مطالعه نشان میدهد که پنجاه فیصد گندم تولید شده در سال ۱۳٤۷ توسط دهاقین و زمین داران مصرف گردیده و تنها نزده فیصد ان به بازار عرضه شده متباقی جهت تادیه قرض و یا تخم و غیره بمصرف رسیده است (تفصیل در جدول یازده)

تولید گندم در افغانستان بالخصوص مسایل تطبیق کود کمیاوی هم زمان با استعمال تخم های اصلاح شده و طرق بهتر کاشت و ابیاری ایجاب مطالعه و تحقیق بیشتر را می نماید .

WHEAT FARMING IN AFGHANISTAN -- COST OF PRODUCTION AND RETURNS

by Khairullah Dawlaty, Zarghuna Saleh
and Gerald P. Owens

INTRODUCTION

Wheat, by far the most important crop in Afghanistan, is grown by traditional methods throughout most of the country. More than half of the wheat acreage in Afghanistan is either irrigated or partially irrigated -- an estimated 7,904,000 jeribs or 1,530,216 hectares in 1968. Dryland wheat is produced on another 7,034,600 jeribs, but the average yield is much lower than for irrigated wheat. Total dryland production normally accounts for only about 20 or 25 percent of total wheat production.

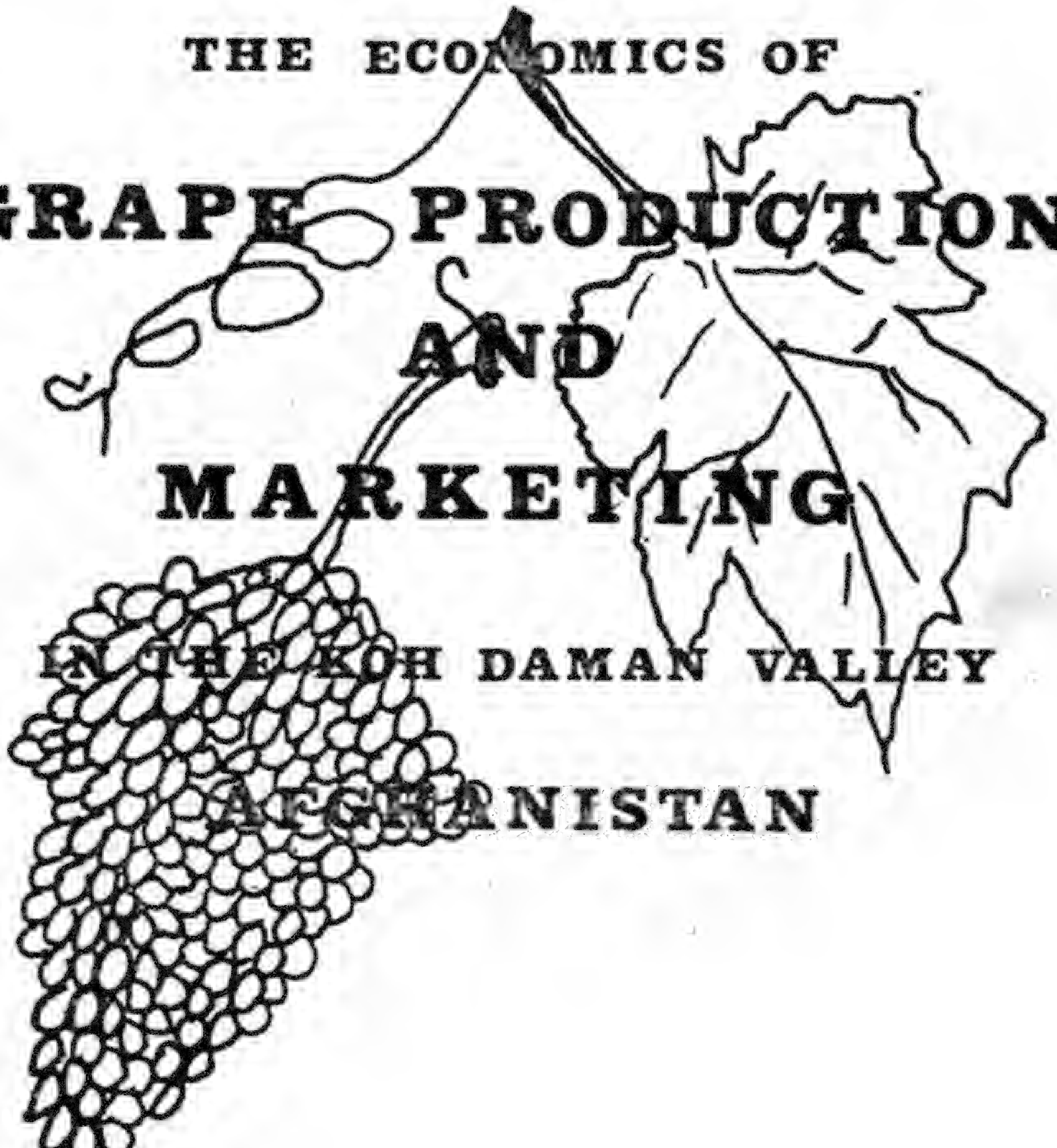
Afghan wheat is consumed mostly in the form of "nan," a flat loaf made of whole wheat flour leavened by a sourdough culture. It is estimated than nan comprises about half of the Afghan diet.

In past years, Afghanistan was considered a deficit wheat producing area. Favorable weather and high prices during 1967, 1968 and 1969 resulted in increased production, thus reducing the required amount of imports. At present, the Accelerated Wheat Program of the Ministry of Agriculture and Irrigation is resulting in additional production through the use of improved seeds, chemical fertilizers, and more modern cultural practices. Seed increase efforts have provided many tons of improved seed and farmers' acceptance of the new seeds and fertilizer is encouraging. Self-sufficiency is possible in the very near future if chemical fertilizer is made available to wheat producers in sufficient quantity. Research trials and demonstrations on farmers' land have shown that it is possible to double or even triple irrigated wheat yields at very little extra cost.

Average yields from improved varieties in the third year of the Accelerated Wheat Program have not been high except on experimental and demonstration plots. This is due to shortages of fertilizer, lack of experience, and other problems that plague new programs. Only about 7% of irrigated wheat acreage will be planted to improved varieties in 1970, according to U.S.A.I.D. estimates. See Table 1 for estimates and projection of wheat acreage, production, and yields in Afghanistan.

K. Dawlaty, R. K. Harlan
and
G. P. Owens

THE ECONOMICS OF GRAPE PRODUCTION AND MARKETING IN THE KOH DAMAN VALLEY AFGHANISTAN



TECHNICAL BULLETIN 7

KABUL UNIVERSITY
FACULY OF AGRICULTURE
Kabul, Afghanistan

November, 1967

THE ECONOMICS OF GRAPE PRODUCTION AND MARKETING IN THE KOH DAMAN VALLEY, OF AFGHANISTAN

by

K. Dawlaty R. K. Harlan

and

G. P. Owens

Kabul University

Faculty of Agriculture

November 1967

Acknowledgements

The authors wish to express their gratitude to Dr. Shah M. Alekozai, Dean, Faculty of Agriculture, Kabul University and to Drs. J.W. Oxley and R. E. Pfadt, Chiefs of Party, Wyoming Team, for their help and encouragement on this research project.

The cooperation and assistance of the following government officials is gratefully acknowledged:

- Mr. Abdul Aziz, Governor of Parwan
- Mr. Saka, Sub-Governor of Qarabaugh
- Mr. Hamed Azizi, Sub-Governor of Sarai Khoja
- Mr. Abdul Hamid, Director of Agriculture, Parwan

The following faculty and staff members of Kabul University gave generously of their time and skills:

- Mr. A. W. Gulistani
- Dr. M. A. Samimi
- Mr. Abdul Mobin
- Mr. Babrak
- Mr. Mir Abbas Frahmand

Table of Contents

ECONOMICS OF GRAPE PRODUCTION AND MARKETING IN THE KOH DAMAN VALLEY, AFGHANISTAN

K. Dawlaty R. K. Harlan and G. P. Owens[1]

INTRODUCTION

Grape production and marketing represent a significant part of Afghanistan's agricultural industry. Raisins and fresh grapes form an important part of the Afghan diet and are major export commodities. Fresh grape exports represent about five percent of the total fresh fruit produced, and raisin exports are approximately ten percent of the total dried fruits.

Data from the Ministry of Commerce show that fresh grape exports doubled in the three-year period 1963, 1964 and 1965. Raisin exports increased about 32 percent from 1961 to 1962 and 47 percent from 1961 to 1963. However, exports declined 27 percent from 1963 to 1964. Since 1964 raisin exports have increased significantly due to more efficient operation of the new raisin processing plant.[2]

More liberal trade agreements with Pakistan and India probably account for most of the increase in fresh grape exports; the same can be said for raisin exports in 1962 and 1963. The decrease of raisin exports in 1964 was probably due to the emphasis on fresh grape exports, leaving less available for the processing of raisins.

Expansion of the export market increases the importance of grape production as a money crop, and favorable producer prices tend to motivate adoption of improved production methods to increase output. An increasing volume of grape and raisin exports also adds more foreign exchange to Afghanistan's treasury.

The Problem

Planning a program to assure sustained economical development of Af-

1 K. Dawlaty is Pohanyar of Agricultural Economics at the Faculty of Agriculture, Kabul University.

R. K. Harlan is Professor and Advisor in Agricultural Economics, University of Wyoming Team at the Faculty of Agriculture, Kabul University.

G. P. Owens is Agricultural Economist, University of Wyoming Team; Advisor in Agricultural Economics to the Ministry of Agriculture and USAID Agriculture.

2 R.G.A. Ministry of Commerce. Data was obtained by A. Mobin. English calendar years 1961 through 1965 correspond with Dari calendar years 1340 through 1344.

ghanistan's agriculture requires sound decisions as to which agricultural commodities should be given priority in using scarce resources to maximize economic returns. Agricultural advisors often are concerned with whether it would be more desirable to exert greater effort and resources toward becoming self-sufficient in all major commodities, or to encourage more specialization in producing certain commodities and rely on foreign trade for other needs.

Input-output and marketing data for agricultural production in Afghanistan are extremely limited but are essential for analyzing the economic aspects of allocating scarce resources to produce those commodities which will maximize returns. Data developed from controlled experiments and collected from surveys of this type provide a base from which commercial farmers can develop their individual operational plans and budgets. Since no previous economic research of the grape industry in Afghanistan has been done, this must be considered a pilot study. In addition to supplying information on production, marketing, and export of grapes and raisins, this study should provide guidelines for future economic research concerned with major commodities.

PRODUCTION
Part I

Objectives

The overall objective of Part I of this survey was to determine the costs and returns of producing grapes in the Koh Daman Valley of Afghanistan. The more specific objectives were:

1. To determine requirements per jerib[3]
   a. family labor
   b. hired labor
2. To determine quantity and costs of other inputs per jerib
   a. amount and cost of fertilizer and pesticides
   b. equipment depreciation and other fixed costs
   c. miscellaneous supply costs
3. To determine returns per jerib
   a. from fresh grapes
   b. from raisins
   c. value of grapes consumed by family

Description of Area

The most important grape-producing provinces of Afghanistan are Kabul, Parwan (Koh Daman Valley) and Kandahar. The provinces of Herat and Logar produce a relatively large volume but almost all of it is consumed locally. Limited quantities are produced and consumed in the provinces of Ghazni, Baghlan, Kunduz, Badakshan, and Kapisa, and in the Vaygul Valley of Nooristan.

The Koh Daman Valley, where this study was made, is just north of Kabul. It and areas around it probably make up the largest and most important grape-producing region in Afghanistan. This valley begins approximately 13 kilometers north of Kabul and extends for nearly 60 kilometers. It is accessible from north of the Hindu Kush mountains through the Salang Tunnel. The Koh Daman Valley is surrounded by several ranges of the Hindu Kush mountains. The Sorkh Koh range north of

3 One jerib = .4784 acre or .1936 hectare

Jabul-i-Saraj forms the northern boundry; the Khwaja Syaran, with heights up to 10,037 feet is on the west; and the Sofi range bounds the eastern side. The Khair Khana Pass through a foothill range provides access to the valley at its southern end about 13 kilometers north of Kabul.

The breadth of the grape-producing area in the Koh Daman Valley extends to about 15 kilometers. Its length is about 50 kilometers, reaching from Qalai Murad Big a few kilometers north of Charikar. Annual precipitation ranges from 320 to 350 mm. Irrigation is essential for grape production, but some dryland wheat farming is practiced in the southwest area of the valley. The main source of irrigation water is from the Gorband River, the Panj Shirr River, kurezes and springs.

Most farmers of the valley specialize in grape production. About 25 percent of the land is planted to vineyards. Other fruits, wheat, barley and vegetables are also grown. The Koh Daman Valley shows recent signs of expanding its grape production. New vineyards are appearing on both sides of the highway which passes through the length of the valley. Newly established vineyards were also observed in all parts of the valley visited in the course of this survey. Improved transportation facilities and expanding markets have undoubtedly supplied the stimulus for this expansion. The area surrounding the two market towns of Sarai Khwaja and Qarabagh account for 75 percent of the valley's total grape production. These two towns are located on the paved highway 53 and 70 kilometers north of Kabul, respectively.

Methodology

Data for the production portion of this study were collected by personal interview surveys during February and March of 1966. A previous attempt to collect these data was made during the same period in 1965, using an English language questionnaire. When data collected with the English schedule were edited and tabulated, too many inconsistencies were discovered and the data were not used.

The first experience proved a good test of the questionnaire. A revised questionnaire was developed in the Dari language which made it possible for the interviewers, whose native language is Dari, to ask the questions with less distortion of their intended meaning than when questions were translated from written English to oral Dari.

Before interviewing any of the grape producers, preliminary courtesies were carefully observed. The Provincial governors and sub-governors were visited to give permission to conduct the survey. On hearing the description of the project, and explanation of its purpose, these persons in responsible positions expressed interest and gave approval without hesitation. This clearance was obtained well enough in advance to enable the governors and sub-governors to notify their village chiefs of when to expect a visit from the survey team. This was not the case with the first attempt, and the villagers were sometimes suspicious and would tend to hedge or give unrealistic answers when responding to questions they were asked.

During the first survey most of the interviewing was done at the village mosque where a group of the villagers would collect to be questioned. In this situation, when a farmer would hesitate in his response to a question, two or three others would speak up to supply answers for him. Too often these

answers probably were not reliable.

The second survey was conducted during a three-week period by three Afghan staff members and two senior students from the Faculty of Agriculture. One hundred grape producers were interviewed in 33 different villages selected at random from the four areas. Figure 1 shows the approximate locations of these villages. Several of the farmers interviewed were contacted while in the villages. Others were contacted individually while pruning vines or shoveling their vineyards (cultivating with shovels).

A careful explanation to the farmers as to the purpose of the study and assurance that the information being sought would never be used to their disadvantage served to minimize suspicions, and to improve the reliability of their responses compared with responses from the first attempt. It is also believed that a greater percentage of private contacts with individual farmers produced more reliable data.

The four main areas, the villages within each area where interviews were made, and the number of interviews per village are as follow:

Areas	Villages		No. Interviews
I. Char-i-Kar:			
	1. Baba Khail		4
	2. Dolana		5
	3. Dah-i-Quazie		4
	4. Sofi Yan		8
	5. Quali-Chi-Sokhta		4
	6. Totom Dara		4
	7. Dahi Mula Yousufe		2
	8. Dahi Hazara		1
	9. Toghberdie		1
	10. Desht-i-Ofian		1
	11. Char-i-Kar City		1
	12. Qalai Belan		1
		Total	36
II. Bagram:			
	1. Khanjar Khail		5
	2. Nowdeh		3
	3. Qualai Nasro		4
	4. Dahi Mullah		3
	5. Qualai Beland		2
	6. Ghulam Ali		2
	7. Shaikha		1
		Total	20
III. Quarabagh:			
	1. Subze Sung		4
	2. Aller		5
	3. Quarabagh Bazaar		4
	4. Gul Darah		2
	5. Khowaja Hassan		3
	6. Jarchie		1
		Total	19
IV. Sera-i-Khoja:			
	1. Qualai Akhond		5
	2. Qualai Khan		4
	3. Dahi Saque		4
	4. Shai Khan		4
	5. Shakar Dara		5
	6. Qualai Murad Big		2
	7. Gul Dara		1
		Total	25

The individual schedules concerning the production part of this study were edited, analyzed, and summarized. Data obtained were not limited to input-output information of grape production but included information about farm size, tenure, family composition, credit activities, farm power and implements, and farmers' opinions as to their most serious problems.

Family Composition

The farm family ranged in size from two members to 26. Average size of the family is 9.39 members. Table 1, below, shows composition of the average family as to number of members according to sex and number of members in each of three age groups.

On the average, more than one-half (58 percent) of the family members are of working age (13-60 years). About 39 percent are too young to work and a little more than 3 percent are too old. An average of five (5) working-age members per family is a relatively adequate family labor force for the average size vineyard except during the peak harvest season.

Farm Size and Tenure

Farm size varied greatly among the 100 producers interviewed. It ranged from .25 jerib to 500 jeribs, and averaged 19 jeribs (vineyard and other cropland). Five of the largest farms account for 56 percent of the total holdings of the 100 farms surveyed. If these five large farms were not included, average size for the remaining 95 farms is 8.9 jeribs (see Table 2).

The number of jeribs in vineyard ranged from .25 to 33 for the 100 farms surveyed, with an average size of 3.5 jeribs. Again excluding the five large farms, the vineyards of the remaining 95 farms averaged three jeribs. Of the entire 100 farms, the five large farms contained 14 percent of total land in vineyards. That portion of total farmland in vineyards for all 100 farms was 18.17 percent. With the five large farms excluded, the portion of total farmland in vineyards was 34.83 percent. Only five percent of the total farmland of the five large farms was in vineyards. All of the five large farms are located in the Bagram area where there is a considerable shortage of irrigation water. This and a shortage of labor during peak seasons probably are deterrents to the planting of more land to vineyards in this area.

Almost all of the 100 farmers interviewed owned the land which they operated. Only three farmers "rented in" extra land. They rented an average of 22.6 jeribs each. Total land holdings for the 100 farmers was 1,920 jeribs, of which 1,430 jeribs were in crop production and 347.8 jeribs (18.17 percent) were in vineyards.

Table 1. Family Composition of 100 Farm Families, 100 Farms, Koh Daman Valley, 1966

Sex	Average No.	% of Total	Age Range (years)	Average No.	% of Total
Male	4.85	51.65	1-12	3.65	38.76
Female	4.54	48.35	13-60	5.44	57.93
			Over 60	.31	3.31
Total	9.39	100	Total	9.39	100

Table 1.

AREA, PRODUCTION AND YIELD OF IRRIGATED AND DRYLAND WHEATS
BY NATIVE AND IMPROVED VARIETIES -- AFGHANISTAN -- 1968, 1969, and 1970

	IMPROVED			TRADITIONAL			BOTH		
	Area (Hectares)	Production (M Tons)	Yield (M Tons/ Hectare)	Area (Hectares)	Production (M Tons)	Yield (M Tons/ Hectare)	Area (Hectares)	Production (M Tons)	Yield (M Tons/ Hectare)
1968:									
Irrigated	20,000	40,000	2.000	1,510,216	2,052,604	1.359	1,530,216	2,092,604	1.368
Dryland	insignificant amounts			1,361,917	667,356	.490	1,361,917	667,356	.492
Total	20,000	40,000	2.000	2,872,133	2,719,960	.947	2,892,133	2,759,960	.954
1969:									
Irrigated	114,150	233,300	2.044	1,466,547	1,901,287	1.296	1,580,697	2,134,587	1.350
Dryland	7,936	5,793	.730	1,278,165	639,360	.500	1,286,101	645,153	.502
Total	122,086	239,093	1.958	2,744,712	2,540,647	.926	2,866,798	2,779,740	.970
1970:									
Irrigated	125,565	262,000	2.087	1,424,435	1,868,000	1.311	1,550,000	2,130,000	1.374
Dryland	8,571	6,350	.741	1,271,429	637,650	.502	1,280,000	644,000	.503
Total	134,136	268,350	2.001	2,695,864	2,505,650	.929	2,830,000	2,774,000	.980

Source: U.S.A.I.D. Agriculture Division

Table 2. Total Farm Land, Average Farm Size, Portion in Vineyards; 100 Farms Surveyed, Koh Daman Valley, 1966

Farm Group	Total Farm Land (Jeribs)	% of Total	Av. Farm Size (Jeribs)	Total Vineyard Land (Jeribs)	% of Total Vineyard	Av. Size Vineyard (Jeribs)	% of Total Farmland in Vineyard
100 Farms	1920	100	19.20	349	100	3.49	18.17
95 Farms	850	44	8.90	295	85	3.10	34.83
5 Farms	1070	56	214.00	53	15	10.60	5.00



Young grapevine.



Mature grapevine.

Production Costs and Labor Requirements

A systematic analysis of production costs for the 100 farmers surveyed was done by first getting an average of each cost item. When these averages were determined, they were collected into two groups. Those costs which occur even when there are no production activities were collected in the group of fixed costs. Cost items which relate only to production activities were grouped as variable costs. Fixed costs include labor for establishing the vineyard, land tax, depreciation of equipment, interest on the land value, and unpaid family labor. Variable costs include annual hired labor, fertilizer, pesticides, supplies, and miscellaneous costs.

Additional calculations were made to determine the average annual costs per jerib as shown in Table 3.

Table 3. Grape Production-Annual Costs and Labor Requirements Per Jerib, 100 Farms Surveyed; Koh Daman Valley, 1966

Cost Items	Units Applied Per Jerib	Cost Per Unit	Av. Cost Per Jerib (Afs.)
FIXED COSTS:			
Labor to Establish Vineyard	84.5 days	45 afs.	63.37*
Land Tax			17.00
Equipment Depreciation			65.80
Interest on Land Value	29,000 afs.	6%	1740.00
Unpaid Family Labor (Operational)	32 days	45 afs.	1440.00
Total Fixed Costs			3326.17
VARIABLE COSTS:			
Hired Labor (Operational)	47 days	45 afs.	2115.00
Fertilizer:			
Animal	88 donkey loads**	3.40 afs.	299.20
Commercial	3.8 seers***	45 afs.	171.00
Chemicals for Plant Protection - Sulphur	.97 seers	60 afs.	58.20
Supplies			172.20
Miscellaneous			105.00
Total Variable Costs			2920.60
TOTAL COSTS			6246.77

* This figure was derived from prorating 3825 afs. (84.5 x 45) over a period of 60 years, expected life of a grapevine.

** One donkey load of animal manure averages about 8 seers.

*** One seer = 15.58 pounds.



Vine pruning must be done by skilled laborers early in the spring.

Average labor requirement for establishing one jerib of vineyard was 84.5 days. This is a fixed cost item which was prorated over the life of a grape plant (average of 60 years) in order to determine annual labor costs per jerib. With average wages for an eight-hour day at 45 afs., annual labor cost per jerib is 63.37 afs. This includes labor for preparing the land, planting the young vines, and taking care of them for four years until they come into production.

Determining annual depreciation cost of implements and equipment used in producing grapes was done by itemizing each piece of equipment according to its average estimated value. Value estimates were supplied by the farmers. When an average value of each item of equipment was determined, additional calculations were made to determine average value of the items as a group and the average expected life of the items as a group. In this manner, the annual cost determined was 65.8 afs. for depreciation of equipment. A set of typical equipment used by the grape producers included plow, harrow, hoe, rake, sickle, shovel, kajawa, pruning knife, baskets, boxes and sacks. Average value of the usual set of equipment was about 329 afs. per jerib.

Expected life of these items as a group averaged five years. Average value of the equipment (329 afs.), divided by the average expected life, determined the annual depreciation cost of 65.8 afs. per jerib.

Since family labor has no alternative opportunity for employment, except perhaps in neighboring vineyards, it was included as a fixed cost and itemized as unpaid family labor. The value of family labor used in producing one jerib of grapes was determined by multiplying 32 days (average number of days of family labor used per one jerib of vineyard) by 45 afs. (average daily wage for an eight-hour day of work in the vineyards). This gave a total unpaid family labor cost of 1,440 afs.

Hired labor costs were included as variable costs. An average of 47 days of hired labor was used in producing grapes from one jerib of vineyard.

Wages ranged from 25 to 63 afs. per day for an eight-hour day. Grape pickers and other unskilled labor were paid 25 to 35 afs. per day. Shovel cultivators were paid 35 to 40 afs. per day. Wages above 40 afs. per day were paid to semi-skilled and skilled labor such as vine pruners. With wages at 45 afs. for an eight-hour day, average hired labor costs per jerib were 2,115 afs. Total labor requirements for producing grapes from one jerib of vineyard averaged 79 days (32 days unpaid family labor + 45 days hired labor). By prorating the 84.5 days used in establishing a jerib of vineyard over a period of 60 years, an additional 1.5 days could be added to give an annual labor requirement of 80.5 days per jerib of vineyard.

The method of determining average costs of fertilizer (470.2 afs.) and pesticides (58.2 afs.) is self-explanatory in the table.

By adding total fixed costs and total variable costs, it was determined that annual costs for producing one jerib of grapes averaged 6,246.77 afs. for the 100 grape-producers surveyed.

Production and Returns

Grape output per jerib ranged from 50 seers to 630 seers. Average production per jerib was 265.3 seers. With 300 vines per jerib, average yield per vine was .8 seer, or about fourteen pounds.

Table 4 shows the average income from fresh grapes and raisins produced from one jerib of vineyard.

Of the 100 farmers surveyed, 33 percent produced and sold only fresh grapes, 40 percent produced and sold only rai-



One of the highest labor-using activities in spring is shoveling in the vineyard.

sins, and 27 percent produced and sold both.

A summary of average costs and returns per jerib of vineyard is presented in Table 5. Family labor and interest on land value are not included in the summary as expense items, since at the current level of technology there are no better alternative opportunities for family labor and land use.[4]

By not including unpaid family labor and interest on land value as expense items, the average net return per jerib to the family was 1,589.56 afs. Based on on this average, the net return to the family with the smallest vineyard (1/4 jerib) was 397.27 afs. ($530)[5] and the net return from the largest vineyard (33 jeribs) was 52,455.48 afs. ($700). For the average vineyard of the five largest farms (10.6 jeribs), net returns were 16,849.34 afs. ($224.65), and for the average size vineyard of the 95 smaller farms (3.1 jeribs), net returns were 4,927.64 afs. ($65.70).

[4] John W. Mellor points out in his book, The Economics of Agricultural Development, pp. 178-179, that in a country where there is a lack of existing alternative opportunities for use of either capital or labor along with the farmer's inability to create such opportunities, the return to land investment is seldom greater than 3 percent and is frequently less than 1 percent.

[5] At the current rate of exchange.....$1.00 = 75 Afs.

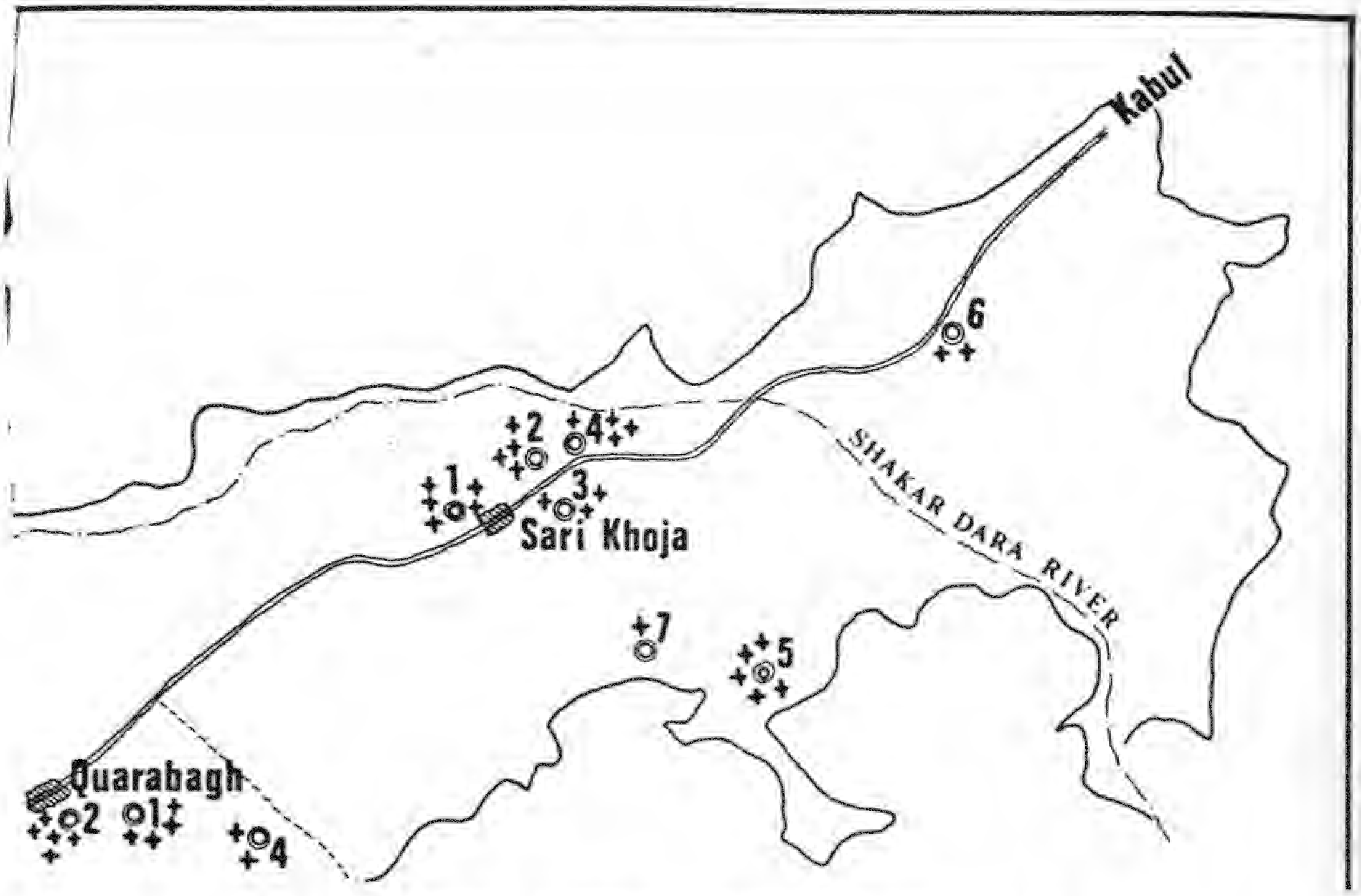
Table 4. Average Income Per Jerib From Fresh Grapes and Raisins, 100 Farms, Koh Daman Valley, 1966

	Seers	Av. Price Per Seer (Afs.)	Total Receipts (Afs.)
Fresh Grapes Sold	91.10	22.40	2040.64
Raisins Sold (146.20)*	29.24*	68.00	1988.00
Home Consumption (Fresh Grapes)	28.00	22.40	627.20
	Total Returns		4655.84

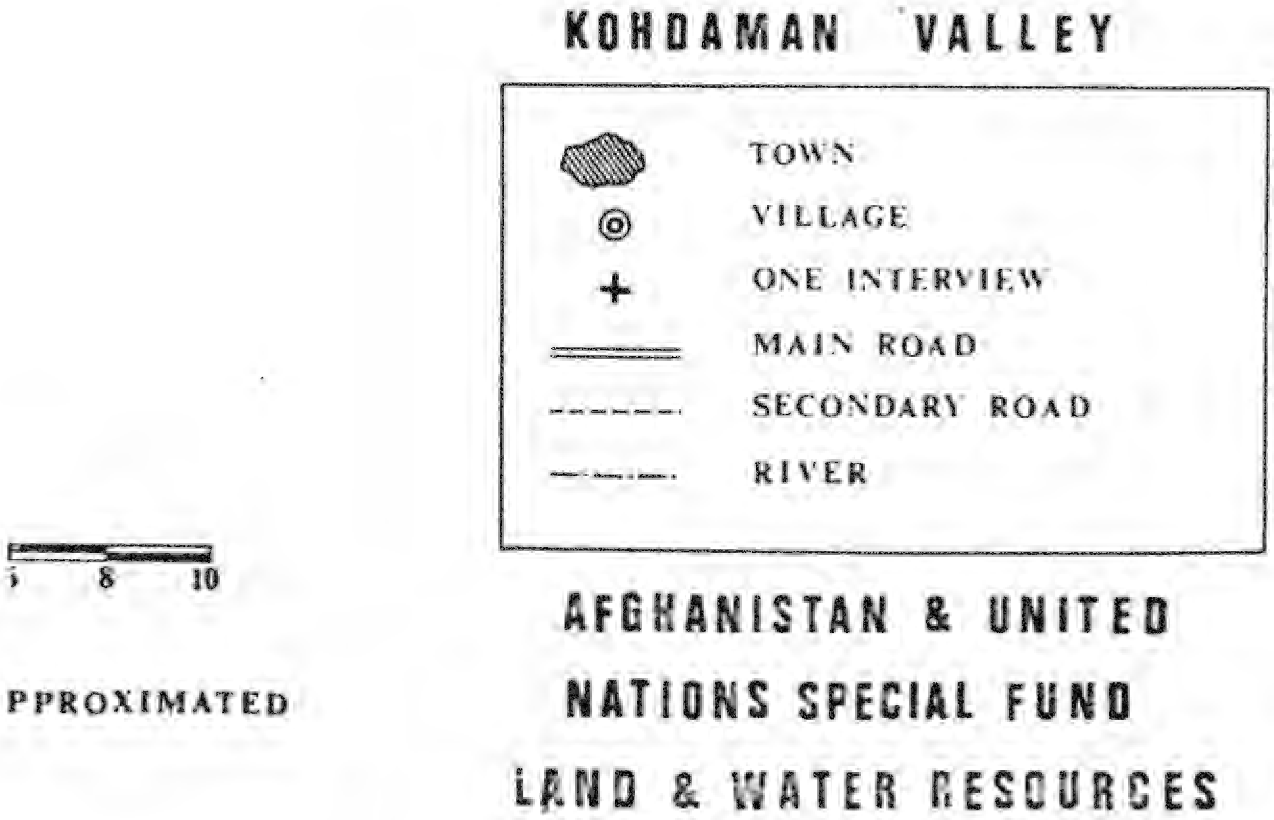
*29.24 seers of Raisins sold are equivalent to 146.20 seers of fresh grapes - Ratio of fresh grapes to raisins is 5 to 1.

Table 5. Average Costs and Returns Per Jerib of Vineyard For 100 Farms, Koh Daman Valley, 1966

	Afs.	
Receipts		
Fresh Grape Sales	2040.64	
Raisin Sales	1988.00	
Home Consumption	627.20	
Gross Receipts	4655.84	4655.84
Expenses		
Hired Labor (Operational)	2115.00	
Commercial Fertilizer	171.00	
Animal Manure	299.20	
Chemicals for Plant Protection	58.20	
Supplies	172.20	
Establishing Labor	63.37	
Equipment Depreciation	65.80	
Land Tax	17.00	
Miscellaneous	105.00	
Total Expenses	3066.77	3066.77
NET RETURNS		1589.07



- Red raisins (kishmish-i-sorkh) are obtained by drying fresh grapes in the sun.



- Shadow-dried "sayagie" raisins are obtained by drying grapes in indoor drying chambers.

Summary and Recommendations

Grapes are an important commercial crop for Afghanistan's domestic market as well as for export. In addition to supplying information on costs and returns of grape production, this pilot study should provide guidelines for future economic research of other major agricultural commodities. Important input-output data for agricultural production in Afghanistan are extremely limited.

Vineyards of the Koh Daman Valley are small, averaging 3.5 jeribs or a little more than 1.5 acres. Family labor is sufficient for this size vineyard except during the peak of harvest. Wages for hired labor are rather high compared to per-jerib returns to family labor. More studies should be made to find ways to maximize efficiency of labor use.

Irrigation water is essential, but it is limited in certain parts of the valley. Studies to determine the most timely application of water, and development of a more efficient system of canals and ditches, would facilitate more effective use of water.

Cultural practices and farm implements are primitive, and average grape yields are low. Yield per vine averages about 14 pounds as compared to an average of 22 pounds per vine in countries using modern production practices.

The wide range in output per jerib (50 to 630 seers) implies the possibility of increasing production significantly and raising the net income, which now averages 1,589.07 afs. ($21.18) per jerib. A minimum of tests and experiments with modern grape production methods will determine which practices are best adapted to grape production in Afghanistan. When appropriate practices are determined, the farmers should be shown, through carefully planned demonstrations, how to apply them. The object would be to determine and encourage adoption of practices which have the greatest potential for increasing per-jerib returns with a minimum of additional costs.

Grape producers in the Koh Daman Valley seem to be very receptive to the adoption of modern cultural practices and the use of fertilizers and pesticides. One of the leading farmers in the Village of Quarabagh Bazaar is cooperating with the Faculty of Agriculture staff on an experimental-demonstration project. He permitted a small vineyard to be used (with assurance of nominal compensation) for experimenting with and demonstrating cultural practices commonly used in the most modern grape-producing countries. Dr. Bergelin of the Faculty of Engineering and Mr. John Perry, a food processing specialist with the Ministry of Commerce, are also cooperating in this project. They are experimenting with and demonstrating certain grape-drying processes.

Extension efforts in grape production similar to this experimental-demonstration project have a higher potential (in terms of increased profits to farmers and foreign exchange earnings) than those in any other crop; with the possible exception of wheat, where the combination of price incentives and concerted extension efforts have already produced significant results.

Summary and Recommendations

Grapes are an important commercial crop for Afghanistan's domestic market as well as for export. In addition to supplying information on costs and returns of grape production, this pilot study should provide guidelines for future economic research of other major agricultural commodities. Important input-output data for agricultural production in Afghanistan are extremely limited.

Vineyards of the Koh Daman Valley are small, averaging 3.5 jeribs or a little more than 1.5 acres. Family labor is sufficient for this size vineyard except during the peak of harvest. Wages for hired labor are rather high compared to per-jerib returns to family labor. More studies should be made to find ways to maximize efficiency of labor use.

Irrigation water is essential, but it is limited in certain parts of the valley. Studies to determine the most timely application of water, and development of a more efficient system of canals and ditches, would facilitate more effective use of water.

Cultural practices and farm implements are primitive, and average grape yields are low. Yield per vine averages about 14 pounds as compared to an average of 22 pounds per vine in countries using modern production practices.

The wide range in output per jerib (50 to 630 seers) implies the possibility of increasing production significantly and raising the net income, which now averages 1,589.07 afs. ($21.18) per jerib. A minimum of tests and experiments with modern grape production methods will determine which practices are best adapted to grape production in Afghanistan. When appropriate practices are determined, the farmers should be shown, through carefully planned demonstrations, how to apply them. The object would be to determine and encourage adoption of practices which have the greatest potential for increasing per-jerib returns with a minimum of additional costs.

Grape producers in the Koh Daman Valley seem to be very receptive to the adoption of modern cultural practices and the use of fertilizers and pesticides. One of the leading farmers in the Village of Quarabagh Bazaar is cooperating with the Faculty of Agriculture staff on an experimental-demonstration project. He permitted a small vineyard to be used (with assurance of nominal compensation) for experimenting with and demonstrating cultural practices commonly used in the most modern grape-producing countries. Dr. Bergelin of the Faculty of Engineering and Mr. John Perry, a food processing specialist with the Ministry of Commerce, are also cooperating in this project. They are experimenting with and demonstrating certain grape-drying processes.

Extension efforts in grape production similar to this experimental-demonstration project have a higher potential (in terms of increased profits to farmers and foreign exchange earnings) than those in any other crop; with the possible exception of wheat, where the combination of price incentives and concerted extension efforts have already produced significant results.

Problem

A great deal of technical information regarding wheat production is available from research efforts of the Ministry of Agriculture and Irrigation. However, little reliable economic information regarding costs of production, returns, and profits is currently available. Economic information is needed for planning subsequent stages of the Accelerated Wheat Program as well as for individual farm planning. Government policy decisions concerning wheat price supports, imports, and wheat program emphasis should be based in part on economic information regarding costs and returns for wheat production. This information is also useful for teaching purposes and future research planning at Kabul University.

Objectives

The primary purpose of this study was to determine costs of producing wheat by three different methods: 1) irrigated wheat using traditional methods, 2) irrigated wheat using improved seed and chemical fertilizers, and 3) dryland wheat using traditional methods. (Little improved seed is used on dryland acreage).

Another objective was to determine returns for these three different methods of production and to calculate the "profitability" in each case.

Methodology

Beginning in late 1968, a schedule was drawn up to be administered to wheat farmers by personal interview. This schedule was designed to provide data on all categories of costs of wheat production and to determine yields and wheat prices for the year 1968. This schedule was pretested in the Kabul area and revised according to experiences of the pretest.

A geographical sample was made to include all three types of Afghan wheat farmers. Personal interviews were made with 225 wheat farmers by five enumerators under the direct supervision of the first author. Prior to actual field work, the enumerators were given a two day training course. Information obtained was for the 1968 harvest year (1347) which had just ended.

The data regarding farm numbers, size, and tenure cannot be projected to yield national totals although cost and returns data are considered representative.

The completed interview schedules were checked over in the field and edited immediately after they were returned to Kabul. The data were then used for the analysis of costs and returns for wheat production.

MARKETING
Part II

Introduction

The second phase of this combined production - marketing study involved five separate investigations:

1. A survey of retail bazaar prices in the Koh Daman Valley.
2. A survey of truckers loading grapes in the Koh Daman area.
3. A study of the wholesale fruit bazaar in Kabul.
4. A survey of grape bazaars in Kabul.
5. Compilation of grape and raisin export data.

The overall objective was to determine as much as possible about the market structure and prices for grapes and raisins.

Retail Prices in the Koh Daman Valley

On November 9, 1966 a small survey crew made 93 price observations at retail bazaars in the producing area. Results are shown in Table 6.

Prices were higher for better grades as would be expected. Also, prices in the grape producing area were generally lower than prices in Kabul as shown in Table 6 by the comparable Kabul prices. Kabul prices will be discussed in detail in a subsequent section.

If a bias exists in the Koh Daman retail prices, it is an upward bias. Prices were determined at bazaars on or near the main highway. Also, there is a recognized tendency for shopkeepers to ask a higher price than they expect to receive. However, the enumerators were Afghan Faculty members and undoubtedly made reasonable determinations in most cases.

Most, if not all, the grapes sold in Koh Daman Valley bazaars from Hassein Kot to Charikar and beyond are grown within a few kilometers of the retail bazaar and are transported by men or donkeys

Interviews With Truckers

Loading Grapes in the Koh Daman Valley

At the same time retail prices were determined in the grape-producing area (Nov. 9), another small crew interviewed truckers who were loading grapes at established pick-up stations for transport out of the area. Objectives were to determine:

A) destination of grapes being loaded
B) prices paid to producer
C) transportation costs and other pertinent information which might appear in such interviews

All truckers were friendly and did not seem to attempt to withhold information. Seven truckers were interviewed using an interview guide. Table 7 shows prices paid to producer.

The wide variation in price was explained by the fact that some, but not all, vineyards had suffered freeze damage, so there was a wide range in quality. In addition, at least two truck drivers reported that certain contractual arrangements between Afghanistan and India had been terminated within the past two days. As a result, the price per seer on the Pakistan market dropped considerably.

Six of the seven truckers interviewed were bound for the Customs clearing house in Kabul and the destination of their grapes was Peshawar. In most cases, trucks were met at Customs by an agent from Peshawar who took the grapes on a consignment basis.

The seventh truck was hauling to the Kabul wholesale market. There were three varieties of grapes on this truck, gathered at different locations in the valley.

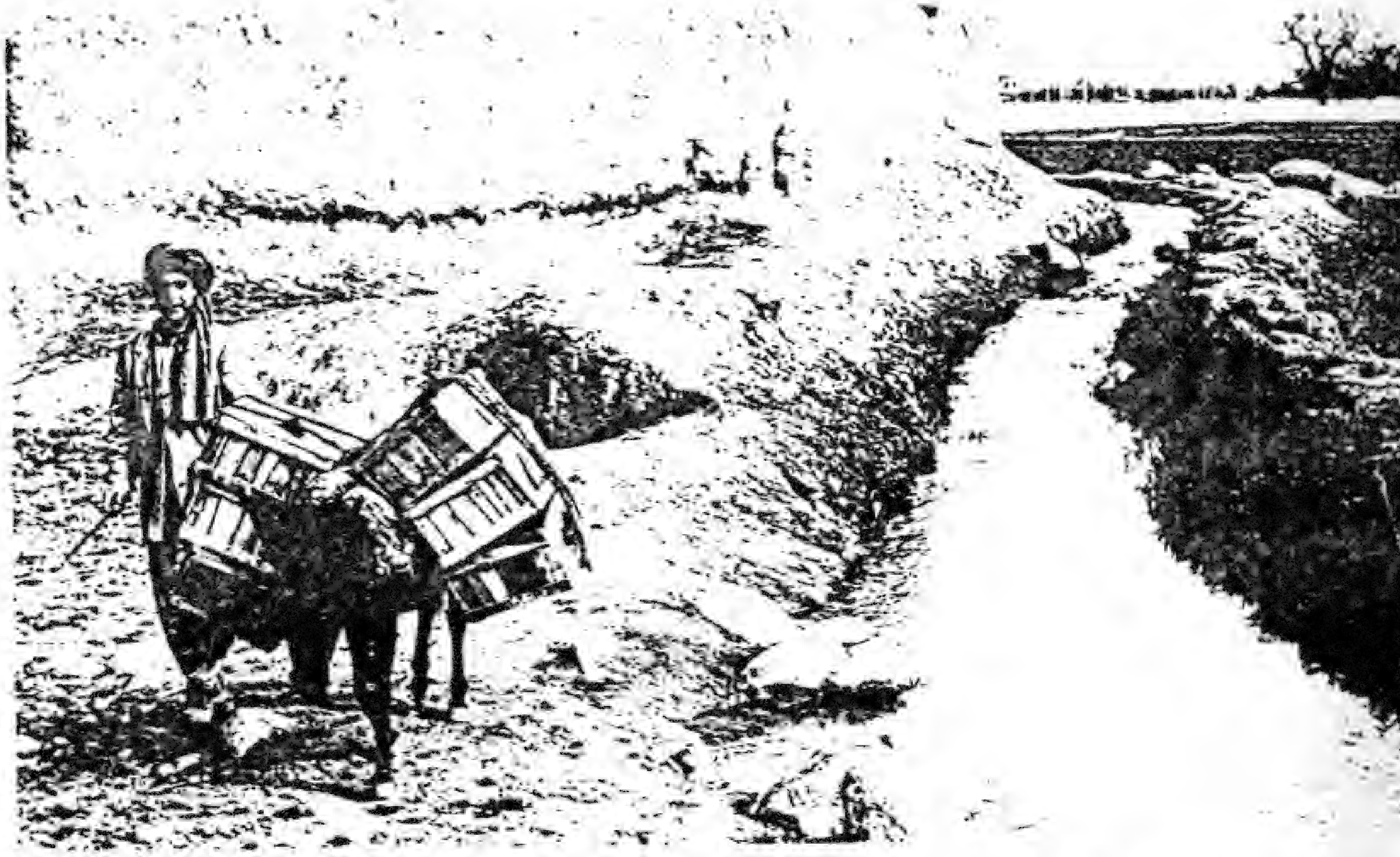
Transportation costs (afs. per seer) to Kabul are shown in Table 8.

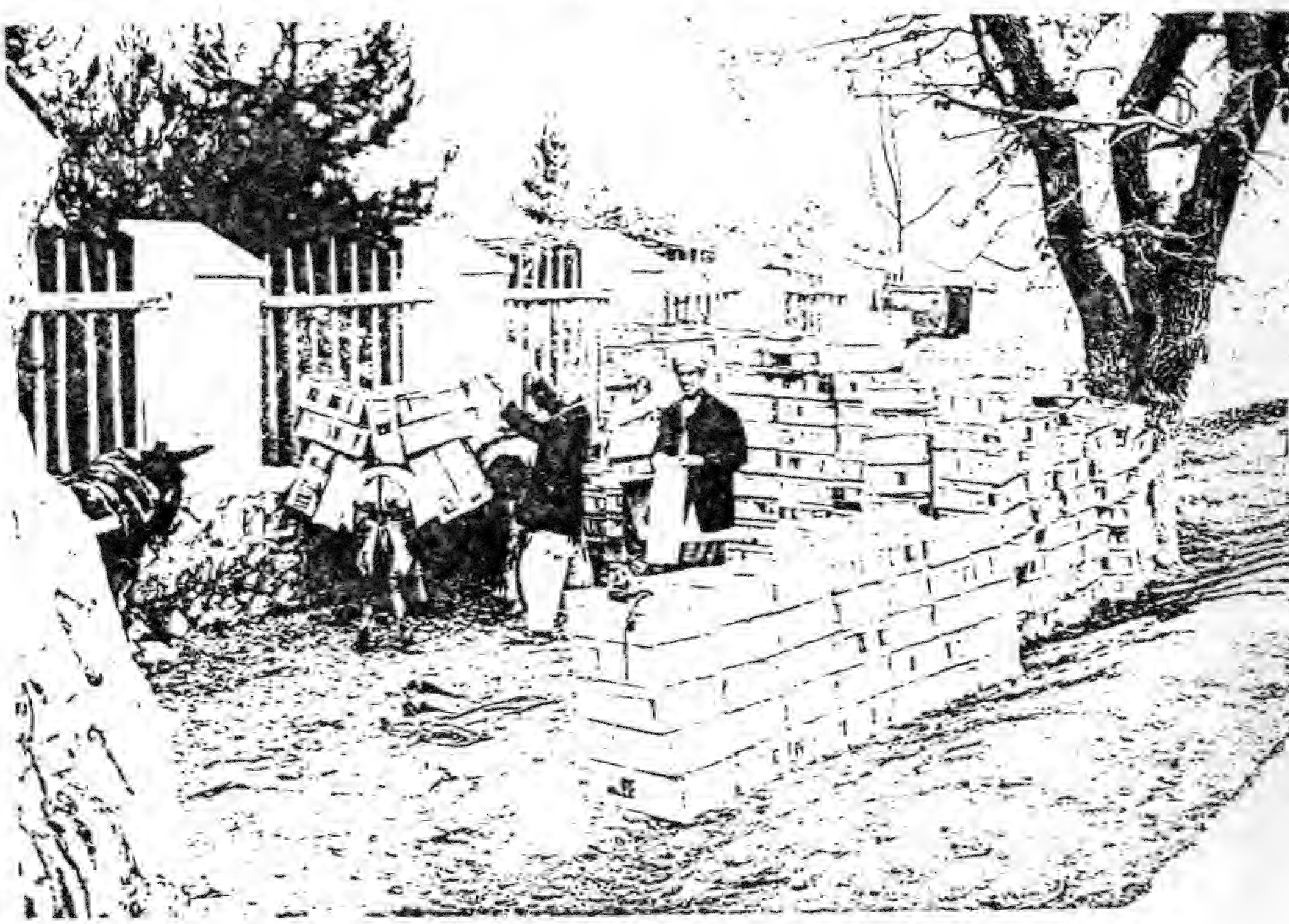
There was general agreement on transportation costs, which appear to be standardized.

Table 6. Retail Price Per Pow of Six Types of Grapes in the Koh Daman Area By Grade

Grade	Kishmishi		Hussaini		Kata		Gholadan		Abjosh		Monaga	
	N*	Av.	N*	Av.	N*	Av.	N*	Av.	N*	Av.	N*	Av.
Good	5	3.2	5	3.3	3	2.0	-	-	1	3.5	1	2.5
Fair	7	2.6	2	3.0	3	2.0	1	2.0	-	-	1	2.0
Poor	1	2.0	2	2.0	5	1.7	2	1.7	-	-	-	-
All Grades	13	2.8	9	2.9	11	1.9	3	1.8	1	3.5	2	2.2
Comparable Kabul Prices	91	3.3	78	3.6	23	2.4	8	1.9	33	3.6	-	-

N* = number of observations





Grapes grown in Koh Daman vineyards are brought
on donkeys to collection centers near the highway.

Table 7. Prices Paid to Producer (Afs. Per Kharwar*) For Four Types of Grapes

Type of Grape	Price Range	Price Average
Kishmishi	2000 - 4000	2712
Kata	1400 - 2000	1740
Gholadan	1300 - 2000	1650
Abjosh		3000**

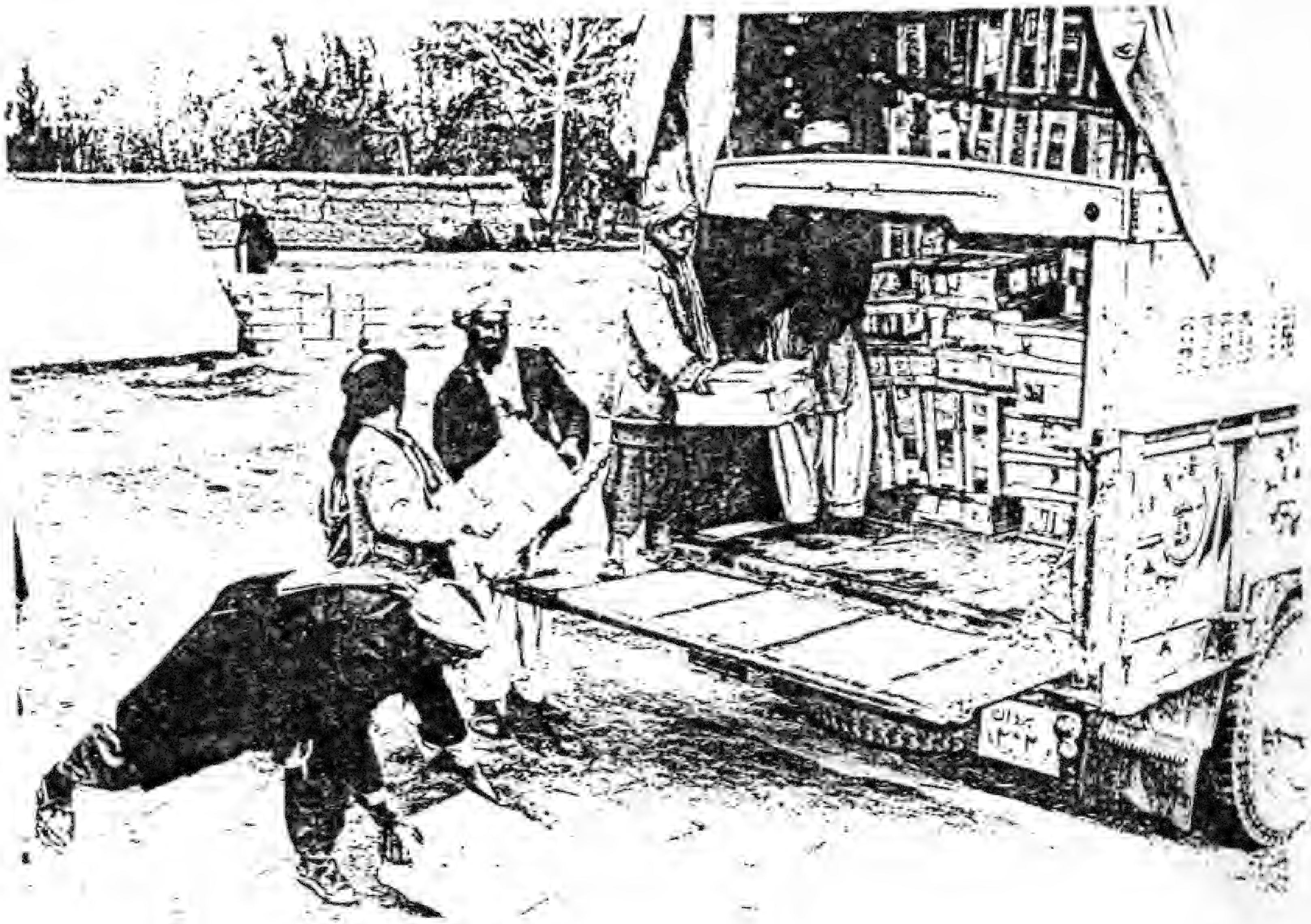
* One kharwar = 80 seers (1,280 pow or 1,246.4 pounds).

** Only one truck (loading for the Kabul Market) had the Abjosh variety.

Table 8. Transportation Rates for Grape Hauling From the Koh Daman Valley to Kabul

From	Cost Afs. Per Seer	Miles	From	Cost Afs. Per Seer	Miles
Hassein Kot	1	15.5	Kalakam	1	24.0
Sarak Goldara	1	18.0	Baghe Iraq	1-1/2	27.0
Sarai Khoja	1	21.0	Charikar	2	37.5

There was general agreement on transportation costs, which appear to be standardized.



Grapes being loaded on trucks at a collection center for transport to Kabul.

Kishmishi grapes were being loaded by all trucks except the one at Sarak Goldara, so apparently these grapes are grown throughout the valley.

Kata variety were being loaded only at Hassein Kot, Sarak Goldara and Sarai Khoja - the areas nearest to Kabul. The trucker at Baghe Iraq mentioned that mostly Kishmishi grapes were grown in that area.

Gholadan grapes were being loaded only at Hassein Kot and Sarai Khoja and the Abjosh variety at Baghe Iraq.

Grapes for export are packaged in 2 seer lugs while grapes for Kabul are packaged in 5 seer crates. Large numbers of both kinds of containers were observed throughout the area, awaiting shipment (or empties waiting to be filled); but by far the majority seemed to be the two seer lugs.

The usual arrangement seems to be for a middleman (in some cases - the trucker) to purchase grapes in the field from the vineyard owner. He then arranges to have them picked, packaged and transported (usually by donkey or camel) to the pick-up station at the highway.



Kishmishi grapes for export are packed carefully in two-seer wooden boxes.

The Kabul Wholesale Fruit Market

A visit was made to the Kabul Fruit and Vegetable wholesale market at Share-Nau. The purpose of the visit was to determine as much as possible about the organization of the market, wholesale prices and origin of grapes.

The market area covers about 21,000 square meters or eleven jeribs. The main market area consists of three rows of open sheds where produce is stored until sold. The following is a list of produce items being sold in the wholesale market:

grapes	pomegranates
melons	pumpkins
squash	tangerines
onions	potatoes
pears	green beans
oranges	cauliflower
quince	dried mulberries
peppers	bananas
apples	sugar cane stalks

Retail merchants of all sizes come to the market to buy grapes which they carry out on foot, bicycle, cart, etc.

During the interviews, three types of grape merchants were identified:

1. Contractor - these people contract with the grower for his produce before the grapes mature. They bring the grapes to market and sell them themselves.
2. Vineyard Owners (growers) - they bring their grapes to market and sell them.
3. Commission Sellers (Agents)- they sell grapes for both contractors and growers for a commission.

Considerable difficulty was experienced in determining prices, for the following reasons.

First - there are no set prices in this market; all prices, both purchase and sales prices, were determined by bargaining.

Second - quality of grapes was hard to determine because most of the packing crates and lugs were not open.

Third - purchase price and sales price were usually calculated in different units of measure, such as afs. per kharwar for purchases and afs. per seer for sales.

All the grapes found in the market this day were from the Koh Daman Valley area. It seemed that a margin of 5 afs. per seer was most usual. As mentioned earlier, price data were difficult to obtain but the ranges of purchase and sales prices shown in Table 9 were the concensus of many wholesale merchants. (When an attempt was made to interview any particular merchant, all the other merchants within earshot would gather around and contribute to the interview).

Table 9. Price Ranges for Grapes in the Kabul Wholesale Market

Type of Grape	Purchase Price*	Sale Price*
Kata	27	30-32
Kishmishi	40-55	50-60
Hussaini	45-50	50-55
Cheshmi-gow	22	26

*Afs. per seer

Several merchants in the wholesale market compound considered themselves as combination wholesaler-retailers - they would sell small lots, crates or two-seer lugs to anyone.

Kabul Retail Fresh Fruit Market

The schedule used in this phase of the study was designed to show: 1) retail prices in large, medium and small bazaars, 2) prices paid for grapes by the retail sellers throughout the fresh grape season (Asad through Aqrab), 3) source of grape and 4) type of seller (retail, wholesale or combination retail-Wholesale).

After the schedule was pretested, eleven enumerators were trained and assigned to work in specific locations which covered most areas of the city and which were known to contain several fresh fruit retail bazaars. Three supervisors went with the eleven enumerators. Eighty-nine schedules were obtained, each from a different bazaar.

After enumeration, schedules were edited and data were hand tabulated. Results are as follows:

Retail Prices: Table 10 shows retail prices in afs. per pow for three grades and six types of grapes.

Other types of grapes observed during enumeration were Chingul-Khani, Kandahari and Chesme-Gow. Price data for these types are not presented in Table 5 because only a few observations were made. Kandahari grapes are quite common during the first part of the grape season, as will be shown later.

When retail grape prices were tabulated according to size of seller, as shown in Table 11, results were not exactly as expected. Larger sellers usually received a higher price than did the smaller sellers. This is probably because the small sellers usually sold the poorer quality grapes and also because they had the poorer locations.

Of the 90 sellers interviewed, at least nine but not more than 17 were

Table 10. Retail Prices of Six Types of Grapes by Quality of Grapes - Kabul, November 7, 1966

Type	Good N*	Good Av	Fair N*	Fair Av	Poor N*	Poor Av	All Grades N*	All Grades Av
	Price - Afghanis Per Pow							
Hussaini	33	3.91	35	3.47	10	2.95	78	3.59
Kishmishi	27	3.59	42	3.22	22	2.71	91	3.29
Abjosh	17	3.70	14	3.59	2	2.50	33	3.59
Kata	8	2.88	10	2.25	5	2.10	23	2.44
Monaqa	4	4.13	1	4.00	2	2.50	7	3.65
Gholadan	-	-	4	2.08	4	1.85	8	1.95

*N = number of observations

combination wholesaler-retailers. This means that they sold grapes (sometimes on a consignment basis) to small retailers for resale in other areas. In all likelihood, they sold their poorer quality grapes to the other retailers.

Major source of supply of grapes was primarily the wholesale fruit bazaar discussed previously. The breakdown of the source of supply is as follows:

	Number	Percent
Direct from Grower	1	1
Wholesaler	80	89
Another Retailer	4	5
Trucker	3	3
Sellers Own Vineyard	2	2
TOTAL	90	100

Prices paid for grapes by retail sellers were determined by inquiring about prices paid during Asad, Sonbula, Maizon and Aqrab. As would be expected, prices are relatively high at the beginning of the season, go down until grapes become more scarce at the end of the season, when the price again rises.

Table 12 shows average grape prices by month for eight varieties of grapes and for all varieties combined.

Most sellers bought several varieties of grapes during the season. Kandahari and Sia Kandahari grapes were most popular at the beginning of the season (during Maizon and Aqrab). Kishmishi are also quite popular at the beginning of the season, but are most popular later on. Kata are late season grapes almost exclusively and the Abjosh, Gholadan and Monaqa were not commonly found during the first two months of the season (Asad and Sonbula).

If number of observations of grapes purchased is used as an indicator, Kishmishi (similar to Thompson Seedless) are the most popular grape overall and are nearest to being an "all season" variety. Hussaini is next in popularity and is most common during the last three months of the season. After Kishmishi and Hussaini, the popularity range seems to be Abjosh, Kandahari, Kata, Monaqa, Gholadan and Sia Kandahari. Other types observed in small quantities were Shunder Khani, Rucha, Chingul Khani, Gerdi, Cheshmi-gow, Sia Gul and Lal.

Table 11. Retail Price of Five Types of Grapes by Size of Seller - Afs. Per Pow

	Large*	Medium*	Small*
Hussaini	3.92	3.49	3.00
Kishmishi	4.06	3.28	2.71
Abjosh	3.70	3.58	2.50
Kata	3.00	2.15	2.00
Monaqa	4.12	-	2.70

*There were 16 large sellers, 35 medium and 39 small sellers in the sample.

Table 12. Purchase Price (Afs. Per Seer) of Grapes by Month, by Eight Varieties and Average of All Varieties

	Asad		Sonbula		Maizon		Aqrab	
	N*	Av.	N*	Av.	N*	Av.	N*	Av.
Hussaini	4	64.0	43	46.3	68	48.0	76	58.9
Kishmishi	24	77.6	51	42.7	71	44.4	78	53.3
Abjosh	-	-	11	37.2	30	51.5	29	63.4
Kandahari	37	60.3	27	52.2	-	-	-	-
Kata	-	-	-	-	3	26.6	21	40.6
Sia Kandahari	9	80.7	-	-	-	-	-	-
Monaqa	1	45.0	2	38.5	12	50.1	2	37.5
Gholadan	-	-	1	32.0	4	26.0	11	56.2
All Varieties	75	67.8	135	45.2	185	47.3	217	55.5

*N = number of observations

Sia Kandahari and Kandahari grapes are the most expensive varieties while Kata is least expensive.

The range from the most expensive to least expensive, according to average purchase price per seer for the entire season, is as follows:

Sia Kandahari	80.7
Kandahari	57.0
Abjosh	54.2
Hussaini	52.3
Kishmishi	50.7
Gholadan	47.1
Monaqa	47.0
Kata	38.8
Overall Average	52.2

Kandahari and Sia Kandahari grapes are early season varieties from Southern Afghanistan and are higher in price because of transportation costs and early season demand. (The same varieties are grown in the Koh Daman Valley, but these mature later).

Prices paid by retailers follow the same general pattern as prices received, i.e. they are highest at the beginning of the season, lower during the months of Sonbula and Maizon and rise again toward the end of the season. Consult Table 12 for details.

There seems to be approximately 2.3 afs. per seer difference between purchase and sales price - relatively small margin of 4.5 percent. This was determined by comparing purchase and sales prices of Abjosh, Hussaini, Kishmishi and Kata grapes - the only varieties with sufficient observations in both categories.

Limitations of Study

It is likely that a certain upward bias existed in reporting of the expense data for this study. Whenever possible, the biases were corrected or adjusted on the basis of similar studies of cotton, sugar beets, and farm equipment by the same authors.

The reader is warned of weaknesses in sampling and questionnaire design which made it difficult to separate or assign costs among the three methods of production. Most of the irrigated-improved wheat in this study was produced in only one area, the Nangarhar region. Furthermore, most of the irrigated-improved wheat was produced on farms which also produced irrigated-traditional wheat. The year 1347 was the first time a significant amount of irrigated-improved wheat had been produced on private lands in Afghanistan. The cost-returns situations can be expected to change as farmers gain more experience and as adjustments occur in the supply-demand situations for major inputs.

Definition of Terms

Irrigated-traditional -- Local wheat varieties grown under full or partial irrigation with little or no chemical fertilizer. These varieties are long-stemmed and not very responsive to fertilizer.

Irrigated-improved -- Imported short-strawed (semi-dwarf) wheat which is more disease resistant and more fertilizer responsive than local varieties. These varieties were originally developed in Mexico. They do very well under irrigation with proper fertilization, even with native cultural practices. However, they are little better than local varieties when grown without chemical fertilizers.

Dryland -- Local wheat varieties (usually the same as irrigated-traditional) grown without irrigation.

Jerib -- One jerib equals 0.1936 hectare or 0.4784 acre.

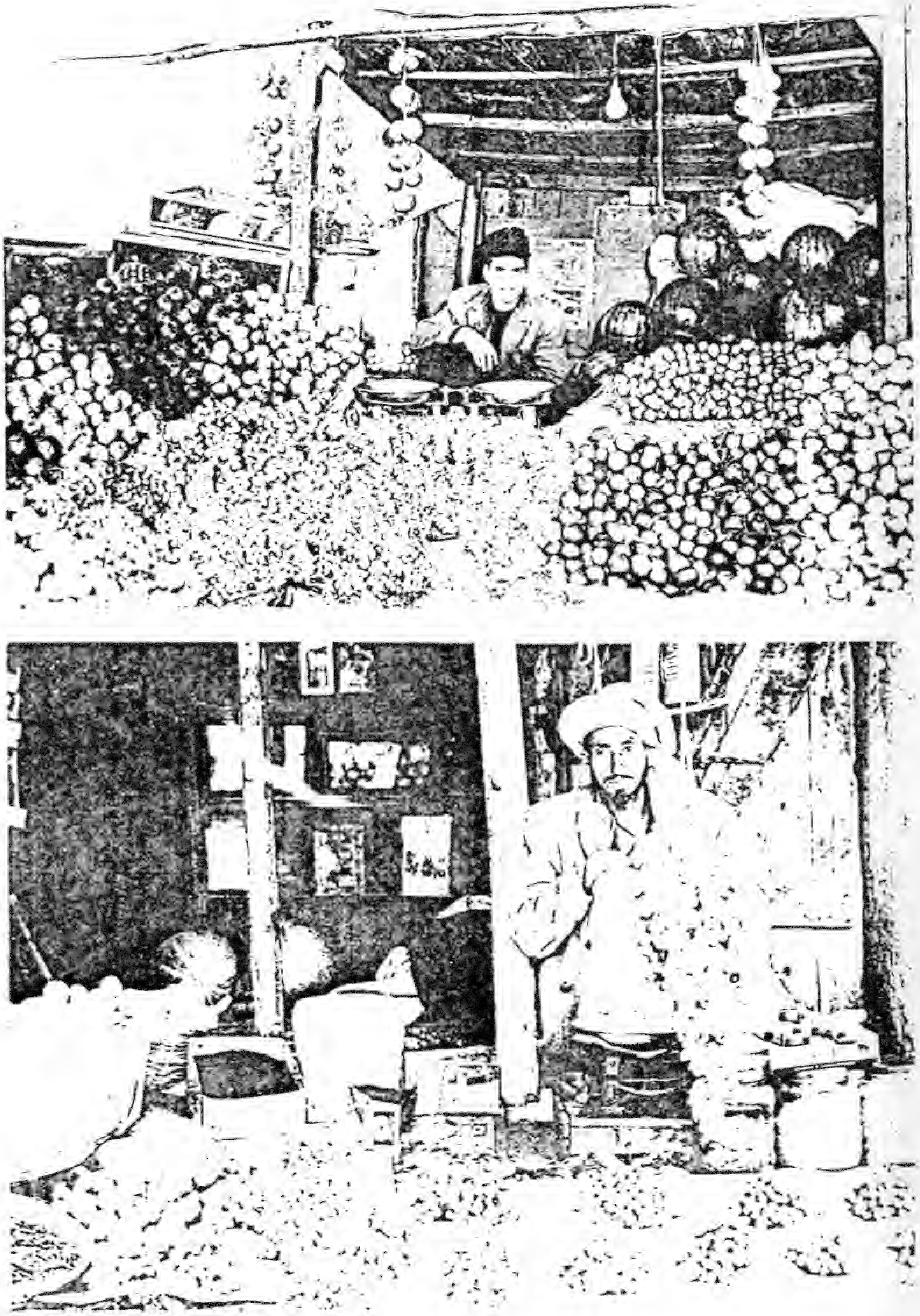
Seer -- One seer equals 16 pow (local measure), 15.58 pounds, or 7.066 kilograms.

Afghani -- One hundred Afghanis (afs) equals approximately $1.33 U. S. ($1.00 U. S. = 75 afs).

The Afghan year 1347 (solar calendar) runs from March 21, 1968 to March 20, 1969.

SUMMARY OF FINDINGS

Table 2 shows costs and returns for three different methods of wheat production.



amples of large (L) and medium (R) grape sellers.

Grape marketing seems to be fairly well organized, at least for the Kabul retail market and for Export. Although there is no apparent authoritative institution for exchange of supply, demand and price information, word of mouth between producing and consuming areas appears to be quite adequate. Prices seem to be quite uniform and transportation, handling and packing costs appear to be standardized in a free market structure. Government regulations and protocol agreements do affect exports, however. Regulation of exports and weather conditions are probably the two major uncertainties.

Export of Grapes

Afghanistan exports grapes to Pakistan, India and the USSR. Exports have been steadily increasing in both quantity and value since 1962 (1341).

Kishmishi is by far the most popular variety for export, amounting to 95 - 99 percent of total fresh grapes going out of the country. Kandahari, Gholadan and Hussaini are exported in smaller amounts.

Pakistan is the most important buyer of Afghan grapes, India is second and the USSR is third. However, the USSR has made no purchases of Afghan grapes since 1962 when they took 95 percent of all fresh grapes exported.

The following table shows amount and value of exports, varieties exported and destination of exports from 1961 to 1964.

Export of Raisins

Afghan raisin exports account for a larger volume of foreign exchange than do fresh grape exports. The following table shows amount and value of exports, types of raisins exported and destination.

Raisins are sent to many more countries than fresh grapes because they are less perishable. Price per kilogram has been increasing but seems to be somewhat irregular from year to year. Green raisins account for the largest volume of exports with red raisins running a close second.

Summary

Fresh Fruits and Dried Fruits and Nuts combined are Afghanistan's largest and most important export item. Domestically, they are an important consumption item.

Grapes are probably the single most important fruit crop, being grown over much of the country. Major producing areas include the Koh Daman Valley and related areas, Parwan Province, Kapisa Province, a large part of the Arghandab Valley, and the Southwestern part of the Logar Valley.

The domestic fresh grape market appears to be well organized with respect to pricing and supply. Investigations revealed that prices were relatively uniform with respect to geographic location (in proportion to distance from Charikar to Kabul) and that seasonal fluctuations in price occurred as would be expected due to the relationships between supply and demand. The transportation system seemed to be fairly well organized. Short hauls from vineyard to nearby market or pickup station were usually by donkey and longer hauls were by truck. Transportation rates appeared to be quite uniform.

The usual marketing channel was grower to middleman (or middlemen) to retail seller or exporter. Very few grapes were retailed in Kabul by the growers themselves.

Most of the grapes in Kabul were sold through a large wholesale fruit market. Four types of middlemen were identified in the wholesale market.

Table 13. Fresh Grape Exports - 1961 - 1964

	Exports			Varieties Exported				Destination		
				Percent of total yearly grape exports by weight				Percent of total yearly exports		
Year	Amount (Kilogram)	Value (Afs.) Total	Afs. per Kilo	Kish-mishi	Kanda-hari	Ghola-dan	Huss-aini	Paki-stan	India	USSR
1961	10,870.191	37,266,958	3.43	95.72	4.22	.06	-	32.3	27.7	40.0
1962	7,370,898	56,121,522	7.62	98.30	-	1.70	-	-	4.9	95.1
1963	14,885,553	119,071,384	8.00	98.80	1.11	.09	-	81.9	18.1	-
1964	26,289,276	246,137,355	9.37	99.844	.105	.031	.020	71.9	28.1	-

Source: RGA Ministry of Commerce. Data obtained by A. Mobin

Table 14. Raisin Exports, 1961-1964

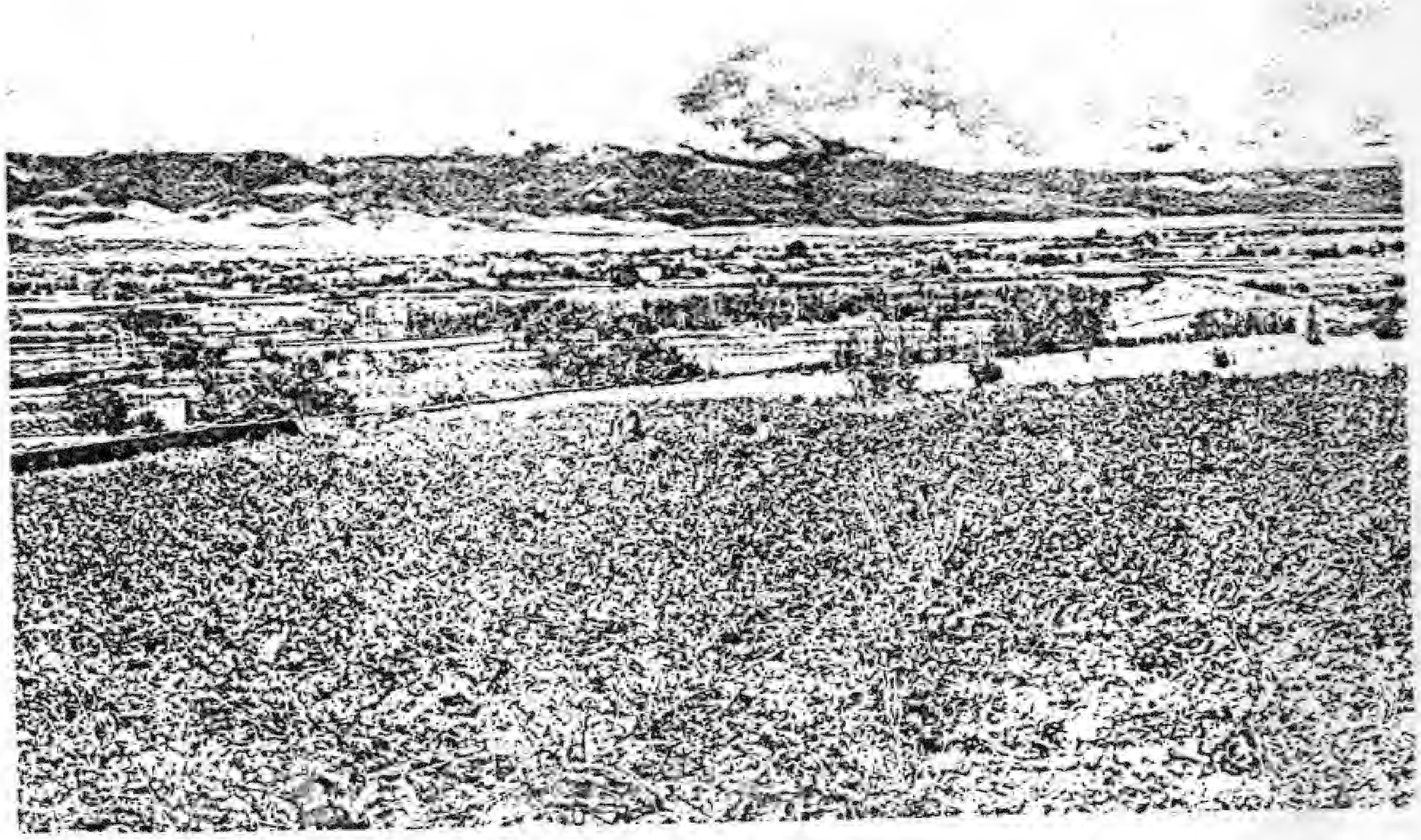
Year	Amount (Kilogram)	Export Value: Total Afs.	Export Value: Afs. per Kilo	Varieties Exported, Percent of Yearly Exports by Weight: Red	Green	Black	Large Red	Large Green	Other	Destination, Percent of Yearly Exports: Pakistan	India	USSR	United Kingdom	Germany	Poland	Czechoslovakia	China	Other
1961	18,894,198	654,212,503	34.63	20.7	56.19	13.03	.024	9.1	7.4	6.7	33.3	58.8	-	-	-	-	1.07	.13
1962	24,919,531	350,169,066	14.05	44.7	43.9	7.22	.4	3.8	-	-	27.64	68.0	.05	-	-	1.01	3.25	.05
1963	27,398,334	348,488,050	12.71	45.2	40.8	7.2	.15	6.6	.5	9.1	56.20	38.15	.07	-	-	.78	.64	.06
1964	19,955,126	442,748,342	22.19	24.1	60.9	6.18	.12	8.5	.2	19.36	45.85	33.31	.91	.18	.33	-	-	.06

Source: RGA Ministry of Commerce. Data obtained by A. Mobin

1. Contractors - contract for grape crop before harvest, take care of handling and transportation to Kabul where they sell through the wholesale fruit market.
2. Vineyard owners - sell their own grapes through the wholesale market.
3. Commission agents - sell grapes for growers, contractors, etc. on a commission basis.
4. Wholesaler - Retail sellers - operate large retail outlets but also sell to other retailers.

The most popular variety in Afghanistan is Kishmishi, a relatively small white seedless grape. Five or six other varieties are also quite popular, and there is a total of more than 15 varieties sold at retail in Kabul.

Exports of fresh grapes are primarily to Pakistan, India and the USSR. Raisins are sold to these same countries and to more distant nations such as the United Kingdom, Poland, Czechoslovakia, Germany and China. Kishmishi is the most important variety for export as fresh fruit and as raisins.



Large vineyard in the Koh Daman Valley.

خلاصه موضوع

مطالب این رساله نتیجه یک سروی اقتصادی است که درجریان سالهای ۱۳۴۴ و ۱۳۴۵ در مورد تولید وفروش انگور در وادی کوهدامن وساحه های میرخان بعمل آمده.

قسمت اول این نشریه حاوی نتایج وحقایق راجع به موضوع تولید انگور در وادی مذکور میباشد. در این قسمت بعد از یک تحلیل مفصل توضیح گردیده که ساحه مزارع متوسط (۱۹) جریب، ساحه باغهای انگور (۳٫۰) جریب، حاصل فی جریب انگور (۲۶۵) سیر، حاصل فی تاک (۱۴) پاو و تعداد تاک ها در فی جریب (۳۰۰) اصله میباشد. مصارف سالانه در فی جریب وعواید سالانه از فی جریب در باغهای انگور در جدول های چهارم وپنجم بتفصیل نشان داده شده. مصارف عمومی در فی جریب (۳۰۶۲) افغانی، عواید عمومی از فی جریب (۴۶۵۶) وعاید خالص از فی جریب (۱۵۸۹) افغانی است.

در جدول اول ترکیب فامیلها توضیح گردیده. تعداد اوسط افراد در یک فامیل (۹٫۳۱) نفر که (۵۸) فیصد آن بین سنهای (۱۳ تا ۶۰) سال بوده ومساعد برای کارکردن میباشند. (۳۹) فیصد افراد فامیلها را اطفال بین سنهای (۱-۱۲) سال تشکیل داده، (۳) فیصد افراد در فامیلها بالاتر از سن (۶۰) سال دارند.

از جمله یکصد مزرعه اینکه سروی گردیده (۹۵) مزرعه آن (۴۴) فیصد ساحه زمین های سروی شده را تشکیل داده در حالیکه (۵) مزرعه بزرگ متباقی (۵۶) فیصد تمام زمین های تحت سروی مذکور را تشکیل میدهد. طوریکه دیده میشود فیصدی بیشتر مزارع کوچک را نسبت به مزارع بزرگ باغهای انگور تشکیل میدهد. (معلومات بیشتر در جدول دوم). آب فراوان برای آبیاری در اکثر نقاط وادی میسر نیست، دریافت طریق درست آبیاری وسیستم تقسیم آب بصورت فنی ایجاب تحقیقات بیشتر را مینماید. کارگران اکثراً در موسم بهار برای بیل زدن وتاک بری ویا در موسم چیدن استخدام گردیده. درغیران کارگران فامیل یا افراد برای اکثر فعالیت ها کفایت مینماید.

قسمت دوم این نشریه مربوط به حقایق است که راجع به ترانسپورت فروش عمده وپرچون وصادرات انگور از یک سروی جداگانه بدست آمده.

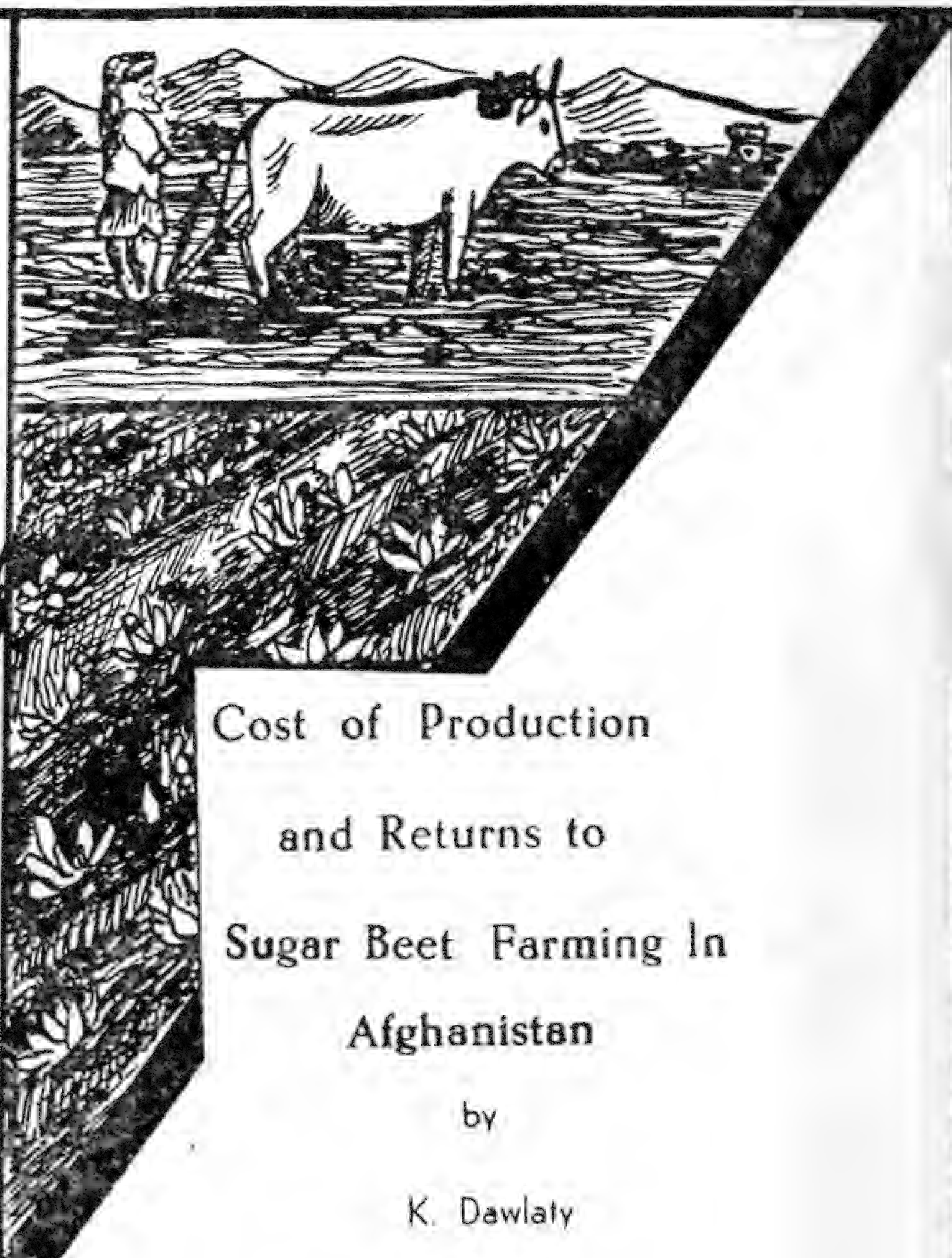
در تمام وادی کوهدامن انگور معمولاً توسط مرکب به مراکز بارگیری موترها در نزدیک سرک عمومی آورده شده بعداً توسط موترها به مارکیت میوه کابل انتقال یافته ویا راساً بعد از تصفیه گمرکی بخارج صادر میگردد.

در نومبر ۱۹۶۷ نرخ انگور در کابل نظر به جنسیت وکیفیت آن از (۲ تا ۳٫۰) افغانی به صورت اوسط (۳) افغانی بود. نرخهای انگور در بازار های عمده (۵) فیصد کمتر از نرخ بازار های پرچون بود. صادرات انگور بخارج از (۱۹۶۲) به بعد رو به تزئید میباشد.

با وجودیکه بشکل اساسی ورسمی نرخها کنترول نشده ومعلومات راجع به اوضاع بازارها موجود نمی باشد معلوم میشود که نرخهای بازار عمده وپرچون ونرخ ترانسپورت ثابت بوده ونشان میدهد که شغل تولید انگور منظم است.

Printed by
USAID/A COMMUNICATIONS MEDIA DIVISION





Cost of Production and Returns to Sugar Beet Farming In Afghanistan

by

K. Dawlaty

Z. Saleh

G. P. Owens

Research Note No. 15

Faculty of Agriculture
University of Kabul
1971

COSTS OF PRODUCTION AND RETURNS TO SUGAR BEET FARMING IN AFGHANISTAN
(KUNDUZ AND BAGHLAN PROVINCES)

By

Khairulah Dawlaty
Instructor of Agricultural Economics Faculty of Agriculture

Zarghuna Saleh
Research Assistant

Gerald P. Owens
Agriculture Economist the University of Wyoming Team

Research Note No. 15

Faculty of Agriculture
Kabul University
Kabul, Afghanistan
August 1971

ACKNOWLEDGMENT

The authors wish to express appreciation to Dean Alekozai and Assistant Dean Nawabi of the Faculty of Agriculture, Kabul University and the Wyoming Team for funding* the project and providing assistance and incouragment.

Appreciation is expressed to the students of the Faculty of Agriculture who did the survey work. Mr. Abdul Rub Noori, Mr. Ghulam Jan, Mr. Jan Mohammad, Mr. Abdul Monir and Juma Khan.

Thanks to the Directors of Agriculture and the Extension personal in Kunduz and Baghlan for their help and guidance during the course of the survey work and to the farmers who provided the information related to costs and returns of cotton production.

*Special acknowledgment to Nebraska Team for additional copies of this technical bulletin (1976.

COST OF PRODUCTION AND RETURN TO SUGAR BEET FARMING IN AFGHANISTAN (KUNDUZ AND BAGHLAN AREAS)

By

Khairulah Dawlaty, Zarghuna Saleh
and G.P. Owens

INTRODUCTION:

The major importance of sugar beet production in Afghanistan lies in it's capacity to save Foreign Exchange. Sugar beet production is concentrated in Baghlan area of northern Afghanistan where the Baghlan Sugar Factory has been in operation since 1320 (1941). Annual production of sugar beet delivered to the factory has varied from 22,200 tons in 1321 (1942) to 67000 tons in 1346 (1967). Annual production of sugar has considerably increased during the 1340 (1961). This increase in domestic production in the face of rising demand for sugar (reflected in the annual imports) represents a considerable amount of saving of Foreign Exchange. Table (1) shows available data on area cultivated in sugar beet, production of sugar beet and sugar and the imports of sugar for the year 1338-1347 (1959-1968).

PROBLEMS:

Cost and returns data for major agricultural commodities are essential for planning and organizing productive resources at both micro and macro levels. At the time this study was undertaken, no such data were available for sugar beet in Afghanistan.

OBJECTIVES:

The over all objective of this study were to determine cost and returns

Table 2.

AVERAGE COSTS (AFGHANIS) PER JERIB OF PRODUCING WHEAT UNDER THREE DIFFERENT CULTURAL PRACTICES, AND RETURNS -- AFGHANISTAN -- 1968

COSTS:	IRRIGATED-TRADITIONAL		IRRIGATED-IMPROVED		DRYLAND	
	Out-of-Pocket Expenses	Other Expenses	Out-of-Pocket Expenses	Other Expenses	Out-of-Pocket Expenses	Other Expenses
Seed	56	100	108	108	28	50
Fertilizer:						
Commercial	35		200			
Organic	62	62		28		
Livestock Feed	157	156	160	160	105	105
Hired Labor	254		308		176	
Depreciation	33		35		18	
Miscellaneous:						
Taxes	5	8	5	8		3
Interest	20		25		13	
Irrig. Repair	10		12			
Other	7		10		5	
Total	649	325	863	304	345	158
Total All Costs	975		1167		503	

RETURNS:	IRRIGATED-TRADITIONAL	IRRIGATED-IMPROVED	DRYLAND
Wheat	1049	1957	365
Straw*	146	125	56
Total Receipts	1195	2082	421
Less out-of-pocket expenses	649	863	345
	546	1219	76
Less other expenses	326	304	158
Returns to family labor, mgmt. & interest on investment......	220	915	-82

*Assuming straw is valued at 3 afs per seer and that 48.7 seers of straw were obtained per jerib of irrigated-traditional wheat, 18.6 for dryland. Straw production for irrigated-improved wheat was assumed to be about 20% less than for irrigated-traditional because of the semi-dwarf characteristics.

Table 1. Area cultivated, production of sugar beets and sugar, Imports of sugar-Afghanistan 1338-1347 (1960-1969)

Year	Area Cultivated 000 Heactares	Production of Beets 000 Metric Tons	Production of Sugar 000 Metric Tons	Imports of Sugar 000 Metric Tons	000,000 Dollars
1338	4.0	44	4.5	35.5	4.4
1339	4.0	44	4.5	30.2	3.6
1340	4.0	44	4.5	41.0	5.0
1341	3.6	61	8.0	30.0	3.6
1342	3.6	56	7.1	10.6	2.4
1343	3.5	31	3.9	35.9	5.7
1344	4.0	56	7.4	25.8	3.0
1345	4.0	56	7.1	70.0	6.4
1346	4.5	67	7.5	57.0	5.3
1347	4.5	62	5.3	-	-

SOURCE: Survey of Progress, Ministry of Planning, 1967-1968 and 1962-1964

for sugar beets production in the Baghlan-Kunduz area of northern Afghanistan. More specifically the objectives were:

a. To determine labor requirements and labor costs per jerib* for sugar beet.

 1. Family labor
 2. Hired labor

b. To determine other inputs and costs per jerib for sugar beet.

 1. Land-value and taxation
 2. Power-work animals
 3. Equipments
 4. Seed
 5. Fertilizer and chemicals

c. To determine production, sales, gross and net returns per jerib for sugar beet.

METHODOLOGY:

The data up on which this study is based were collected by direct interview with the farmers in late 1346 (1967). A pretested written field schedule dealing with sugar beet and cotton production were administred by five trained Senior students of the Faculty of Agriculture under the direct supervision of the first author. With the assistance of the Directors of Agriculture and Extension personal in Baghlan and Kunduz a sample of 130 farmers who grew sugar beet or, cotton and sugar beet were located and

*1 Jerib = .1936 Hectare = .4784 Acres

interviewed. After tabulation, data were available for 73 sugar beet enterprises. Data on cotton were analysed and published as the Faculty of Agriculture Research Note Number 12. Upward biases in reporting the expenses and downward biases in reporting the information related to the returns on sugar beets were felt in many instances during the interview. These biases were corrected or adjusted in the field or during the checking and editing of the schedules before tabulation of the data.

RESULTS:

The average size of the 73 sugar beet farms was about 20 jeribs in which about 4 jeribs were planted sugar beet and the rest were in other crops. The average sugar beet production per jerib was 3.40 tons per jerib. All of the beets produced were sold to the Baghlan Sugar Factory by contract. The expenses per jeribs of sugar beet production is displayed in Table (2) in four catagories. They are:

1. Labor expenses
2. Cost of materials
3. Depreciation of working capital
4. Miscellaneous costs

Sugar beet requires 44 man-days of labor per jerib for various operations listed in Table (3). About 50% of the labor time is used in the operations of weeding-cultivating and harvesting. The plowing-planting catagory is the next high labor using operation. The seed is planted in late March and April, but much of it is grown in seedbeds for the first two or three months before it is transplanted. Following the plowing-planting, catagory transporting, application of the animal manure and irrigation are the major

labor using operations each requiring about 6 man-days of labor. Twenty nine man-days of labor (66% per jerib) is provided by the farmers family while 15 man-days are supplied by hired labor at an average wage rate of 42.67 Afghanies per day including one meal. (Table (2).

Cost of materials per jerib was estimated to be 265.83 Afghanies. Seed and chemicals were provided by the Sugar Factory. Depreciation of working capital (livestock and equipments) were computed through straight line method. An annual depreciation per head of livestock was computed by dividing the difference between the present value and the estimated salvage value of a particular type of animal into its expected useable life. The result was multiplied by the average number of that particular type of livestock kept on farm and divided by number of jeribs on farms to obtain the cost of livestock depreciation per jerib. The same procedure was used to compute the depreciation of equipments per jerib. Due to limitation of time the estimate for the expenses of livestock feed was not possible, however, an estimate of 150 Afghanies per jerib became available later in the study of wheat farming in Afghanistan by the same authors.

The last catagory of costs were the repair of Karize and Canal, tax on land, interest paid on borrowed capital, hauling and transporting of the beets, and interest on capital investment (value of the land). The total of this catagory was 756.4 Afghanies per jerib. All of the expenses are catagorized into two groups (Table 3):

1. Out of pocket expenses
2. Other expenses

The first catagory includes all of "those expenses for which the farmers

Table 2. Expenses per Jerib for Growing Sugar Beets 73 Farmers Surveyed in Baghlan and Kunduz Provinces 1346 (1967)

Expense Catagories	Unit/Jerib Afs.	Cost/Unit Afs.	Cost/Jerib Afs.
1. Labor Expenses/Jerib			
Family Labor	29.29 Days	42.67	1244.68
Hired Labor	14.75 Days	42.67	634.50
Sub Total	44.04		1879.18
2. Cost of Material/Jerib			
Seed	0.86 Seer*	0	0
Commercial Fertilizer	2.19	27.27	59.73
Manure	112.67 Load	1.76	198.34
Chemicals	0.20 Seer	0	0
Other			7.76
Sub Total			265.83
3. Depreciation of Working Capital/Jerib			
Livestock			
Horses			2.50
Oxen			16.57
Donkeys			0.80
Camels			0.12
Equipment			
Karachi			4.55
Wheelbarrow			0.22
Other			10.74
Sub Total			35.5
4. Miscellaneous Costs/Jerib			
Repair of Kariz & Canal			42.47
Taxes			15.79
Cost of Borrowed Capital			14.52
Hauling & Transport			75.00
Interest on Land Value			608.82
Sub Total			756.4
		Total	2936.91

*1 Seer = 7.066 Kg.

must produce either the cash or credit on a yearly basis and which are directly related to the production process"*. The second catagory are indirect expenses and payments to the family labor.

Feed for working livestock is not counted as a cash expense based on the assumption that livestock graze much of the year and the minimum feed amount given to them when they work, are grown on the farm. Cost of animal manure is not included in Cash Expenses due to the assumption that there is no marketable cash value for animal manure, inspite of the fact that farmers did report an imputed value of (1.76) Afghanies per load of manure for an average rate of (112) loads per jerib.

Interest on land value (609 Afs./jerib) and unpaid family labor with the imputed value of 1249.80 Afs./jerib were not added to the cost because at the present stage of technology there are no better alternative use for land and family labor than the opportunity of employment in agriculture**.

The total out of pocket expenses per jerib were 880 Afghanies (Table 3). All the sugar beets were sold to the Baghlan Sugar Factory. Total return (Table 4) with an average yield of 3.40 tons of sugar beets (priced at 576 Afghanies per ton including the value of the beet tops at 23 Afs.) were 1984.18 Afghanies per jerib. The returns to family labor and management and investment was 1104.03 Afghanies per jerib.

---

*"Wheat Farming in Afghanistan Cost of Production and Returns". K. Dawlaty, Z. Saleh and G.P. Owens. Technical Bulletin No. 17 Faculty of Agriculture, Kabul University, Kabul, Afghanistan 1970. PP. 7.

**John W. Mellar states in his book The Economics of Agricultural Development. (PP. 178-179), that in a country where there is a lack of existing alternative opportunities for use of either capital or labor along with the farmers inabilities to creat such opportunities. The return to land is seldom greater than 3% and is frequently less than 1%.

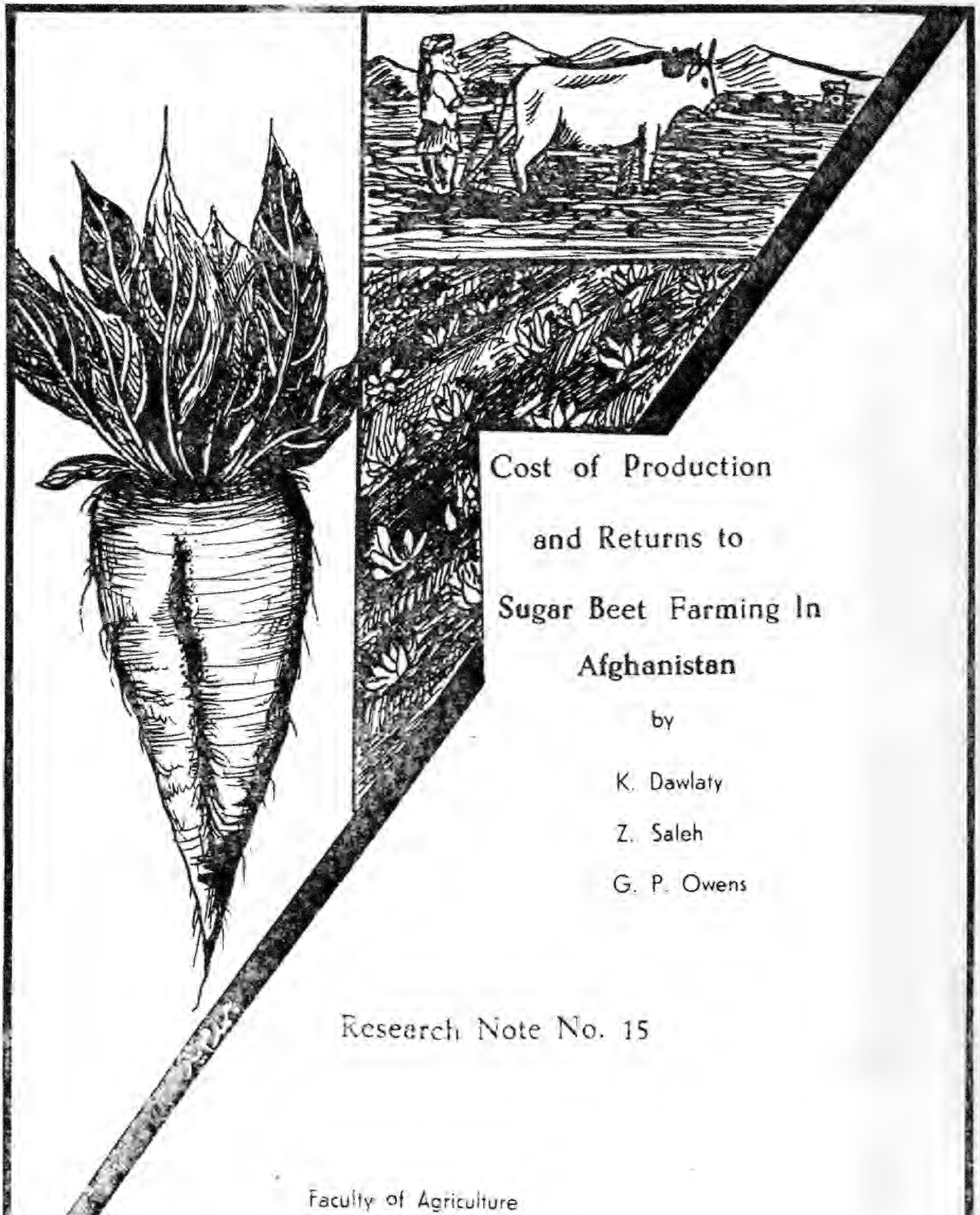
Table 3. Out of pocket and other expenses per jerib of Sugar Beet (Afghanies) 73 Farms in Kunduz and Baghlan 1346 (1967)

Items	Labor (Man-Day) Family	Hired	Cost (Afs)*	Materials etc. Amount or Rate	Cost Afs.	Total Afs.
Out of Pocket Expenses						
Plowing-Planting	5.8	2.56	109.24			109.24
Weeding-Cultivating	7.36	4.44	189.45			189.45
Fertilizer Application						
Commercial	1.32	–	–	2.19 Sr.	59.73	59.73
Manure	4.55	1.83	78.09			78.09
Irrigating	4.07	1.67	71.25			71.25
Harvesting	6.81	4.25	181.35			181.35
Depreciation						
Livestock						19.99
Equipments						15.51
Materials						
Chemical				.20 Sr.	**	
Seed				.86 Sr.	**	
Others						7.76
Interest on Loans						14.52
Taxes						15.47
Repair of Kariz & Canals						42.47
Hauling & Transport						–
Total	29.29	14.75	629.38			880.15
Other Expenses						
Interest on Land Value (10147 Afs./Jerib)				6%	608.82	608.82
Livestock Feed					150.00	150.00
Manure				112.67 Loads	198.34	198.34
Family Labor	29.29					1249.80
Total						2206.96

*Hired Labor, 42.67 Afs./day
**Provided by Sugar Factory

Table 4. Returns per Jerib of Sugar Beet (Afghanies) 73 Farms in Kunduz and Baghlan 1346 (1967)

Items	Yield/Jerib	Price/Unit Afs.	Total Afs.
Income from Sugar Beet			
Sugar Beet	3.4 Tons	576	1960.94
Beet Tops			23.24
Total Income			1984.18
Less out of Pocket Expenses			880.15
Return to Investment & Family Labor			1104.03



Cost of Production and Returns to Sugar Beet Farming In Afghanistan

by

K. Dawlaty

Z. Saleh

G. P. Owens

Research Note No. 15

Faculty of Agriculture
University of Kabul
1971

FARM TRACTORS AND WATER PUMPS IN AFGHANISTAN - A STUDY OF UTILIZATION, ECONOMIC EFFICIENCY, TECHNICAL ASPECTS AND PROBLEMS OF ACQUISITION AND OWNERSHIP

by

Khairullah Dawlaty

Richard Saunders

Gerald Owens

Technical Bulletin No. [illegible]

Faculty of Agriculture, Kabul University

December 1969

ACKNOWLEDGEMENTS

The authors gratefully acknowledge assistance and encouragement from the following people:

1) Dr. Horst Von Oppendfeld, IBRD Agriculture Credit Mission, for suggesting the study be conducted.

2) Dr. Afzal and Mr. Rahami, President and Vice President of the Agriculture Bank, respectively, for sponsoring the study and granting permission to publish the findings from the study.

3) Dean Shah M. Alekozai of the Faculty of Agriculture for permitting staff to cooperate in conducting the study

4) Provincial Governors, Directors of Agriculture and Personnel in the Branch offices of the Agriculture Bank for assistance in carrying out field work.

5) Mr. Lewis Clark, A.I.D. Agriculture Credit Advisor, HAVA, and his Afghan associates for conducting field work in the Helmand-Kandahar area.

6) The farmers of Afghanistan who own tractors and pumps for providing information for this survey.

7) Professor Art Fabricius, Agricultural Engineer, Wyoming Team for technical assistance in evaluating tractors and pumps from the engineering and performance standpoint.

8) The Study Coordinating Committee made up of representatives of the Ministries of Agriculture and Irrigation, Finance, Planning and the Agriculture Bank for encouragement and advice in planning the study.

Dryland wheat is at best a gamble in Afghanistan. Even though very little out-of-pocket expenses are incurred (345 afs per jerib) these may not be recouped because of low yields in years of unfavorable weather. On the other hand, handsome profits have been realized in years when weather was favorable.

Irrigated wheat, traditional method, is more likely to be profitable. This study shows that very little money was left for interest on investment and for family labor in 1968, although returns more than covered out-of-pocket expenses.

Experience with irrigated wheat, improved method, is very limited in Afghanistan, but results from this study are very encouraging. Yields are, on the average, almost twice as much as the yields of traditional wheat and costs are only slightly higher. These costs are important, however, because they include a higher proportion of out-of-pocket expenses. Total costs for producing irrigated wheat, improved method, are 192 afs per jerib more than for traditional method. Out-of-pocket expenses, however, are 214 afs per jerib more for improved wheat production than for traditional wheat production. Many small farmers have difficulty meeting these expenses, especially if they have no ready source of reasonable credit.

Research and demonstrations on farmers' land indicate the possibility of even higher yields (up to over 100 bushels per acre or 184 seers per jerib) from proper use of improved seed, chemical fertilizer, and certain modern cultural practices.

Farmers in this study received an average price of 38 afs per seer for the wheat they sold.

AREA, PRODUCTION, AND YIELD

Table 3 shows the number of farms surveyed in each category, total and average acreage, production, and yield. Although only 225 farms were surveyed, many of them produced wheat by more than one method. All the farms which produced irrigated-improved wheat also produced irrigated-traditional wheat. Most of the farmers who produced dryland wheat also produced irrigated wheat.

Average area in total farmstead for this study was 45.7 jeribs (8.8 hectares).

Yields reported in this study were somewhat lower than yields shown in Table 1. For example, irrigated-improved yields were estimated at about 55 seers per jerib (30 bushels per acre) in 1968 compared to 51.5 seers per jerib reported in this study. In Table 1, irrigated-traditional wheat is estimated at about 37 seers per jerib compared to 27.6 for this study.

TABLE OF CONTENTS

TABLE OF CONTENTS
(CONTINUED)

LIST OF TABLES

LIST OF TABLES
(CONTINUED 2)

SUMMARY OF KEY FINDINGS

Tractors

Average tractor use is relatively high in Afghanistan, as compared to U. S. A. standards, especially in the central area. Plowing is the most important use for tractors. They are also used a great deal for hauling and private transportation and are sometimes used in lieu of oxen in grain threshing operations.

Returns from tractor use on dryland crops were low.

Depreciation, operating costs and maintenance are higher than normal for the U. S. A. Operators expectations as to useful life seem to be overly optimistic.

In the early stages of partial mechanization covered by this study, tractor usage resulted in large increases in area cultivated, in total production and in sales of agricultural products. Tractors did not replace labor significantly, but caused a significant shift in tenancy and hired labor patterns. Deqan tenants (who furnished little more than labor in the tenancy arrangements) gained at the expense of ejaradar tenants (who furnish oxen, seed, etc. as well as labor). Also, hired labor gained slightly over tenants. Tractors replaced animal power very significantly.

Benefits from tractor use (value of additional production plus savings on oxen and income from custom work less total tractor costs) were about 6[illegible],[illegible] afs per year for all tractors. Benefits were highest in northern Afghanistan ([illegible]5,[illegible]7[illegible] per year)

lower in southern Afghanistan (35,02%) and negative in central Afghanistan (-67,52%) where tractors were used a great deal on extensive farms (dryland wheat).

Pumps

Pumps in central Afghanistan are used about three months of the year for supplemental irrigation. Some have been used on newly reclaimed land and are the primary source of irrigation water. Pumps are used primarily to irrigate wheat and alfalfa and clover are the next most important crops.

Pump owners were able to increase their cropland more than 200 percent but there was evidence that they overextended themselves because yields declined.

Net percentage increases in sales were extremely high, but this is misleading because many pump owners began to sell farm produce only after they obtained the pumps.

Pump use resulted in significant increases in farm labor and tenants. Animal power requirements also increased, but slightly less than labor requirements.

Benefits to pump ownership based on net increases in production less additional costs were negative, on the average.

The following data are a summery of major findings:

TRACTORS

Utilization	Overall Average
Hours used per month	132
Percent of use for plowing	2
Percent of use for hauling	20
Percent of use on Irrigated Wheat	[illegible]
Percent of use on Dryland Wheat	31

Costs	Overall Aver[illegible]
Original cost of Byelarus tractors (afs)	3[illegible],[illegible]2[illegible]
Original cost of Massey-Ferguson tractors (afs)	35,2[illegible]
Estimated useful life (years)	9-10
Annual depreciation - Byelarus (afs)	2[illegible],[illegible]00
Annual depreciation - Massey-Ferguson (afs)	2,000
Annual operating costs - Byelarus (afs)	[illegible]0,000
Annual operating costs - Massey-Ferguson (afs)	100,000
Rates for custom work (afs per hour)	170

Effects of Tractors on Production	Overall Average
Percent change in area cultivated annually	186
Percent change in annual output of major crops:	
Irrigated Wheat	+ 33
Dryland Wheat	+1429
Barley	+ 120
Corn	+ 371
Cotton	+ 209
Oilseeds	+ 3[illegible]

Effects of Tractors on Sales	
Percent change in Crop Sales:	
Wheat (irrigated and dryland)	+162
Corn	+282
Cotton	+ 92
Clover and alfalfa	+ 32
Oilseeds	+ 65
Melon and watermelon	+660
Mung Beans	+121

Effects of Tractors on Farm Labor Force	
Percent change in number of:	
Total farm workers	-3.6
Eiaradar (Keshtegar) tenants[1]	-56
Deqan (buzgar) tenants[2]	+2[illegible]
Full-time hired laborers	+2[illegible]

Effects on Annual Power Requirements	
Percent change in number of bullocks	-36

Benefits	
Value of additional output per farm per year (afs)	+133,753
Savings on oxen maintenance and degrae per farm/year (afs)	+2[illegible],3[illegible]
Total benefit per farm per year (afs)	+162,063
Less total tractor costs per farm per year (afs)	+115,[illegible]6[illegible]
Net benefit per farm per year (afs)	46,[illegible]

1) Keshtegar (Pashto) - a tennant who provides his own labor and other inputs such as oxen, implements, fertilizer in the tenure arrangement.

2) bazgar (Pashto)- a tennant who provides his own labor and little or nothing else in the tenure arrangement.

WATER PUMPS

Utilization	Overall Average
Days operated annually	[illegible]3
Percent use on:	
Wheat	[illegible]
Alfalfa and Clover	1[illegible]
Corn and Barley	[illegible]
Melons	2
Other crops (including vegetables)	6

Costs

Original cost of:	
Baco (Pakistan) 20 HP (afs)	33,055
Baco (Pakistan) 7½ HP (afs)	5[illegible],5[illegible]1
Soviet 14 HP (afs)	13,[illegible]91
Annual operating costs:	
10-20 HP	22,21[illegible]
13-16 HP	3[illegible], 5[illegible]
7-10 HP	2[illegible],511

Effects of Pumps on Production

Percent change in area cultivated annually	+256
Percent change in annual output of major crops:	
Irrigated Wheat	+2[illegible]3
Dryland Wheat	-39
Alfalfa and Clover	+203
Melons	+1060
Corn and Barley	+3[illegible]5
Vegetables	+420
Other Legumes	+233
Other Crops	+300

Effects of Pumps on Sales

Percent change in annual crop sales:	
Wheat (irrigated and dryland)	2600
Corn	
Vegetables	+33[illegible]
Melons	+900
Oilseeds	+297
Tobacco	+107
Alfalfa and Clover	
Other Legume Crops	+364

Effects of Pumps on Farm Labor Force	Overall Average
Percent change in number of:	
Total farm workers	+2[illegible]0
Deqan tenants	+5[illegible]6
Full-time hired laborers	+66
Part-time hired laborers	+229
Effect on Annual Power Requirememts	
Percent change in number of bullocks	+77
Benefits	
Value of additional output per farm per year (afs)	51,210
Less total pump costs per farm per year (afs)	83,589
Net loss per farm per year	-32,379

Table 3.
AREA, PRODUCTION, AND YIELD:
225 WHEAT FARMS IN AFGHANISTAN -- 1968

	No. of Farms	Total Area in Wheat (jeribs)	Av. Area Per Farm (jeribs)	Total Production (seers)	Av. Production Per Farm (seers)	Yield (seers per jerib)
Irrigated:	219	4151	19.0	121,814	556.0	29.3
Traditional	182	3842	21.1	105,899	581.9	27.6
Improved	37	309	8.4	15,915	430.1	51.5
Dryland	55	2730	49.6	26,188	476.1	9.6
All Farms	225	6881	30.6	148,002	657.8	21.5

COSTS OF PRODUCTION

At the present stage of development of Afghanistan's agriculture, the most useful categorization of costs is probably 1) "out-of-pocket expenses" -- those for which the farmer must produce either the cash or credit on a yearly basis and which are directly related to the production process, 2) indirect expenses which require a cash outlay at more indefinite times and which are also applicable to other farming or household operations, and 3) payment for family labor and management and returns on investment. In the case of irrigated-improved wheat production, it is important to identify the additional costs (above the costs of producing irrigated-traditional wheat) which must be incurred. This is in contrast to fixed and variable costs.

Fertilizer

Very little, if any, fertilizer is used on dryland wheat. Usually the wheat is planted under conditions which might be described as minimum--minimum cost, minimum tillage, minimum care. The land (often public or normally unused land) is plowed, planted and left alone (except sometimes for a guard) until harvest. This sometimes turns out to be a "little ventured; nothing gained" situation. Good dryland wheat crops are considered windfall gains.

Irrigated-traditional wheat land is usually fertilized with a mixture of barnyard manure, soil and other organic materials at fairly high rates. This study shows an average of 30.7 "donkey loads" (5-7 seers per load) or almost 1½ tons per jerib. This figure was questioned by the authors, but further investigation provided no basis for lowering the figure. Some of the sources of this material are barnyard sweepings, irrigation ditch residue and old mud walls. No blanket statement regarding the value of these applications can be made because of lack of knowledge about their nutritive values, particularly

Farm Tractors and Water Pumps in Afghanistan -
A Study of Utilization Economic Efficiency, Technical
Aspects and Problems of Acquisition and Ownership

by K. Dawlaty, R. Saunders and G. Owens*

INTRODUCTION

Backround and Situation

Beginning about 1963, the Agriculture and Cottage Industries Bank of Afghanistan, hereafter referred to as the Bank, imported Byelarus and Massey-Ferguson tractors and four types of water pumps. These tractors and pumps were sold on credit to farmers in various parts of Afghanistan. Most of the Byelarus tractors were sold in northern Afghanistan; most of the Massey-Ferguson tractors were sold in central and southern areas. Water pump sales were concentrated in the Ghazni, Katawaz, Moqor and Kalat area of central Afghanistan. Table I shows the distribution of Bank-financed tractors and pumps by province.

Although a large number of water pumps have been imported privately, most of the privately owned farm tractors in this country have been imported under the auspices of the Bank.

Recently, the Bank ceased operations in this field, but is currently negociating a loan from the World Bank (IBRD) which will allow it to resume operations. This study was undertaken in hopes of improving future Bank operations in the field of financing agricultural equipment.

---

*K. Dawlaty is assistant professor (pohanmal) of Agricultural Economics at the Faculty of Agriculture, Kabul University. Dr. Saunders is an Agricultural Economist with the Robert Nathan Associates USAID Contract Team - advisors to the Ministry of Planning. Dr. Owens is Agricultural Economics advisor to the Facutty of Agriculture, Kabul University; employed by the USAID/Wyoming Team Contract.

Table I

The Distribution of Bank-Financed
Tractors and Water Pumps in Afghanistan

Location	Tractors		Water Pumps		
Province	Beleyrus	Massey-Ferguson	20 HP	15 HP	7½ HP
Kabul	2	2	7	7	1[illegible]
Logar	-	1	1	-	-
Paktia	-	4	3	-	-
Ghazni	2	2[illegible]	69	7	5
Orozgan	-	-	-	-	1
Zabul	-	2	37	-	6
Kandahar	-	43	45	1	1
Helmand	-	35	-	-	1
Chakhansur	-	7	10		6
Farah	-	7	-	1	16
Ghor	-	21	-	-	-
Herat	-	-	6	-	2
Faryab	7	-	-	-	-
Jowsjan	3	-	-	1	-
Wardak	-	-	-	-	1
Balkh	32	-	1	-	1
Samangan	13	-	-	-	-
Kunduz	22	1	3	-	3
Baghlan	11	-	1	-	-
Parwan	-	-	-	2	3
Takhar	1[illegible]	-	1	-	-
Kapisa	1	-	-	-	-
Laghman	1	-	-	-	-
Nangarhar	-	-	1	-	-
	154	152	185	1[illegible]	61
Ministry of Agr.	22	20	-	-	-
Nangarhar Project	10	-	-	-	-
Sugar Factory	2	-	-	-	-
Cash Sales & Oth.	~~12~~	28	-	-	-
	200	200	185	19	61

Some bad debts were accrued in previous operations. Also, conditions of future need and demand for tractors and pumps are unclear. This is also true for efficiency and economic performance of tractors and pumps in Afghanistan. More information on the relationship between mechanization and unemployment is needed. Information regarding the effect of tractors and pumps on land reclamation and development is also needed.

Objectives

The broad objective of this study is to shed as much light on the above stated problems as possible. More specifically:

A. To investigate conditions of need and demand for tractors and pumps by geographical area if possible.

B. To examine the current uses of tractors and pumps.

C. To examine the effects of tractor and pump ownership on employment and land use.

D. To investigate problems associated with obtaining tractors and pumps and problems associated with ownership and operation.

Procedures

The primary tool for gathering information for this study was personal interviews with tractor and pump owners using a schedule pretested with tractor and pump owners near Kabul. Related data and information from other sources were used whenever possible. Twenty-eight tractor owners were personally interviewed by author Dawlaty in the northern and central areas. Professor Dawlaty also personally interviewed 2[illegible] pump

28
18
46

owners who had a total of 43 pumps in the central area. These interviews were conducted in April and May, 1969. Mr. Lewis Clark, Agricultural Credit Specialist, USAID Lashkar Gah, and associates interviewed 10 tractor owners in the southern area during this same period.

A list of all tractor and pump owners provided by the Bank was stratified geographically and randomly sampled. An alternate sample was drawn for use when owners selected in the stratified random sample were not available for interview.

After enumeration, data were tabulated in raw form and then analyzed by various sorts and cross-tabulations to obtain the required descriptive data and relationships.

Limitations of Study

The major limitation to this study results from size and stratification of sample. Although the universe was not large ([illegible] tractors and 265 water pumps) only [illegible] tractors and 43 pumps were covered by survey information. This was due to the decision to make extensive interviews and to limitations of time and funds. Only three major areas (7 provinces) were studied, leaving out tractor use in western Afghanistan

The study was designed, tabulated, analyzed and reported in English while enumeration was carried out in Farsi.

Definition of Terms

Ejaradar - Persian word for tenant classification; usually provides seed, machinery and animal power as part of tenancy share arrangement.

Cashgar - Pashtu word equivalent of ejaradar.

Deqan - Persian word for tenant classification; provides less than ejaradar tenants and recieves a smaller share of crops.

Buzgar - Pashtu equivalent of deqan.

1 jerib = .4733 acres = .1936 hectares

1 seer = 15.53 pounds = 7.066 kilograms

1347 (local year) = March 21, 1968 to March 20, 1969

100 afs = $1.33 U.S. (75 afs = $1.00 U. S.)

TRACTORS

Utilization

Tractors in this study range from six years of age to less than one year. Most of the tractors were purchased in 1345 and 1346 (roughly 1966 and 1967).

Tractors in the notth had been used an average of about 17 months, those in the central area about 11 months and those in the south about 20 months. Average total hours used ranged from 1849 in the central area to 2131 in the south. Average hours per month were about 93 in the north, 133 in the central area and 125 in southern Afghanistan. This is relatively high usage compared to U. S. standards. Daily use during the busy season averaged 9.36 hours in the central area, 10.57 hours in the north and 12.2 in the south. Number of idle days per year ranged from 113 in the south to 134 in the central area. This information is shown in detail in Table II.

Plowing was by far the most important use for tractors, as all 44 were used for this purpose. All tractors were used for hauling also, but they were not used as much for this purpose.

Table II. Tractor Utilization. 1977

Months Used, Hours Used, and Average Hours Per Month, Hours Per Day During Busy Season and Days Idle Per Year, By Region

	Months Used		Total Hours Used		Hours Per Month		Hours per Day Busy Season		Days Idle Per Year	
	Aver.	Range	Aver.	Range	Aver.	Range	Aver.	Range	Aver.	Range
North	19.0	9-31	1881	1500-3260	99.0	65.6-166.7	10.6	9-12	[illegible]	[illegible]
Central	10.1	6-13	1848	1026-2025	182.6	78.9-232.5	9.4	3-12	[illegible]	[illegible]
South	19.7	14-27	2434	1000-5500	123.9	58.0-220.0	12.2	3-13	[illegible]	[illegible]
Overall	16.6	6-36	2098	1000-5500	132.0	53.0-232.5	10.9	3-13	[illegible]	[illegible]

Table III shows the number of tractors used for the various operations and average number of days per year that the tractor was used for each operation. Number of tractors reporting for each operation is expressed as a fraction of all tractors in the area (or the overall study) - for example 14/18 tractors means that 14 of 18 tractors in the south were reportedly used for discing.

Many tractors were used indirectly in the planting operation even though this is not reflected in Table III. Many farmers pulled a mallah behind the disc or field cultivator to cover up seed which had been previously spread by hand.

Cultivating was reported as plowing in the northern and central areas because the implement there is known as a "chisel plow" and is generally used for stirring loose soil rather than cultivating growing crops. Use of the field cultivator or "chisel plow" is reported separately for the southern regions. (Field cultivator or tiller was not provided with Byelarus tractors.)

Most threshing was done by driving the tractor over grain on a traditional threshing floor.

Considerable tractor work in the central area was for land leveling, which indicates that considerable new land was brought into production or improved. Land leveling was negligible in the northern area and was not done in the south (most tractors in the south were on project land where leveling is done by the Helmand-Arghandab Valley Authority).

Table III. Tractor Utilization, 13[illegible]
Average Days of Use Per year by Various Operations

	Plowing N*	Plowing Days	Planting N	Planting Days	Cultivating N	Cultivating Days	Discing N	Discing Days
North	[illegible]	73.[illegible]	3/1	7.5	[illegible]	0	[illegible]/14	25.3
Central	12/12	7[illegible]	0	0	0	0	[illegible]/12	1.[illegible]
South	[illegible]/18	54.0	0	0	17/18	37.[illegible]	[illegible]	13.0
Overall	[illegible]4/44	70.9	3/44	2.4	17/44	15.5	2[illegible]/44	13.[illegible]

	Threshing N	Threshing Days	Hauling N	Hauling Days	Custom Work N	Custom Work Days	Land Leveling N	Land Leveling Days
North	9/14	16.6	14/14	52.3	7/14	13.0	2/14	[illegible]
Central	[illegible]/12	7.3	12/12	27.7	6/12	15.7	9/12	3[illegible]
South	1[illegible]/18	[illegible].3	18/18	22.6	5/18	4.0	0	[illegible]
Overall	30/44	10.3	[illegible]4/44	33.4	18/44	1[illegible].0	11/44	13.[illegible]

*N Number of operators who reported any amount of tractor use for specified operation expressed as a fraction of all tractors in region or in overall study.

Less custom work was done in the south than in the other areas. Some operators said they would do more custom work if parts were more readily available. See Table III for details of tractor utilization by operation. Table IV shows rates charged for custom work and Table V shows average time required for various tractor operations.

Tractors are most used in the fall. Next most important season is summer, then spring. Tractors are used very little in the winter. See Table VI.

Table IV. Rates for Custom Work.
Afs Per Hour for Plowing, Cultivating, Discing, By Region

	Plowing	Cultivating	Discing
North	150	150	130
Central	153	153	153
South	206	205	200
Overall	173	170	163

Table V
Time Required For Various Tractor Operations (Hours) Per Jerib

	NORTH		CENTRAL		SOUTH		OVERALL	
	Aver. Hours	Range	Aver. Hours	Range	Aver. Hours	Rng.	Aver. Hrs.	Range
1st Plowing	.67	.33-1	.63	.25-1	1.0[illegible]	.[illegible]-1.50	.[illegible]	
2nd Plowing	.61	.25-1	.33	.10-.[illegible]5	.7[illegible]	.50-1.0[illegible]	.60	
Discing	.35	.12-.75	.21	.10-.33	.36	.2[illegible]-.[illegible]	.32	
Cultivating					.36	.25-.50	.3[illegible]	
Cultivating - Mallah Combination					.[illegible]	.17-.6[illegible]	.[illegible]	
Disc-Mallah Combination					.25		.25	
Planting					.1[illegible]		.1[illegible]	

available nitrogen and phosphorous. Costs per jerib were 124 afs for organic fertilizer and 35 afs for commercial fertilizers totaling 159 afs as shown in Table 4. (See also Tables 5 and 6).

Some farmers also applied commercial fertilizer to irrigated-traditional wheat. It is not known whether this was nitrogen, phosphorous or both. The average rate for all irrigated-traditional farms was about 15 lbs. per jerib at a cost of about 35 afs.

In this study, fertilizer costs per jerib for irrigated-traditional wheat were only 69 afs lower than for irrigated-improved wheat. However, a higher proportion of the fertilizer costs for irrigated-improved wheat must be classified as out-of-pocket expenses.

Irrigated-improved fertilizer costs were 228 afs per jerib (5 seers per jerib at an average cost of 40 afs per jerib for chemical fertilizer). The additional 28 afs were for organic fertilizer. Presumably the chemical fertilizer was in the form of urea and superphosphate or urea and diammonium phosphate in close proportion to M.A. & I. recommendations, but at a somewhat lower rate. Application of "organic" fertilizer to improved wheat is not officially recommended although some farmers do apply it.

Seed for dryland and irrigated-traditional wheats is allotted from wheat used for food and is either saved from last year's crop, or purchased (from neighbors or at the bazaar) at near market prices. Average retail price of wheat in 1968 was about 41 afs per seer in fall and winter. Respondents reported a cost of 39.51 afs per seer. Seedling rate reported in this study was 2 seers per jerib for dryland wheat and 4 seers for irrigated-traditional wheat. Seeding rate was about 4½ seers for irrigated-improved wheat, but price of seed was higher. Irrigated and dryland wheat is planted by "broadcasting" (sown by hand) in Afghanistan. Because much of the broadcasted wheat seed is too deep or too shallow, the seeding rate could be lowered significantly by the use of grain drills or mechanical planters. Although the Ministry of Agriculture and Irrigation sold improved seed to many farmers at 40 afs per seer, other farmers paid a premium, of money or through barter, in order to obtain improved seeds from other farmers. In 1968, the actual cost was about 50 afs per seer. Seed cost appears to be higher in 1969 because of greater demand. Some farmers in the eastern provinces bartered 2½ seers of local wheat for one seer of improved Mexipak wheat in 1969.

Irrigated-traditional and irrigated-improved wheats are irrigated about 4 times per season, depending on climatic conditions and water availability. No direct water costs are assigned in this study. Irrigation costs are included in the labor and canal repair categories.

Feed for livestock consists largely of straw with clover or alfalfa and some grain supplement. The animals graze much of the year and are fed mostly when working. During the winter, they receive a minimal diet. (Table 7). In most cases, more cases, more than half of the livestock feed is grown on the farm.

Table VI. Tractor Utilization, 19[illegible]7
Average Days of Use, By Season

	Spring		Summer		Fall		Winter	
	N*	Days	N	Days	N	Days	N	Days
North	[illegible]	57.3	13/14	59.2	14/14	57.[illegible]	[illegible]	[illegible]
Central	12/12	59.7	11/12	54.9	12/12	48.3	3/12	5.5
South	13/13	27.3	13/13	[illegible].6	18/18	75.9	11/13	6.7
Overall	[illegible]	45.6[illegible]	42/44	50.[illegible]	[illegible]	62.4	27/44	10.2

*N Number of operators who reported any amount of tractor use during specified season expressed as a fraction of all tractors in region or in overall study.

Table V11 shows percent of total seasonal use for various operations and percent of total use for various operations during each season.

Table V111 shows tractor use for various crops by area and in the overall study. From the standpoint of number of jeribs on which tractor was used, wheat is by far the most important crop. Cotton, corn, alfalfa and clover are also quite significant. Dryland wheat is quite important in the central area, but not in the south.

Table IX shows average size of largest and smallest fields on which tractor is used. From this information, it would seem that small field size is not a major problem for tractor utilization in Afghanistan. It should be noted, however, that after these fields are prepared and planted by the tractor, they are usually ridged and/or ditched into very small plots for flood irrigations. This would affect tractor cultivating and harvesting operations. Also, the ridges and ditches must be smoothed out before the tractor can be used to prepare the soil for the next ceop. Many tractors in the central area are used on widely separated fields.

Implements provided as part of a "package deal" (inwhich the farmer had no choice) were, for the Byelarus tractor;

1. Three-furrowed moldboard plow
2. Disc Harrow
3. Four Wheel tractor-trailer
4. Front-mounted scraper blade

For the Massey-Ferguson 135:

1. Three furrow moldboard plow - MF 793
2. Tandrem Disc Harrow - MF 722
3. Nino-tine tiller (field cultivator or "chisel plow" MF 729
4. Three-ton tipping trailer MF 17-7
5. Multipurpose blade-terracer MF 721

Table VII
Tractor Operation by Season, Percent Overall

	Spring	Summer	Fall	Winter		115.8
Plowing	35.6* / 55.3**	26.3 / 37.2	35.0 / 39.3	3.1 / 21.1	100.0%	58.2
Discing	21.3 / 6.9	11.3 / 3.3	59.5 / 13.8	7.4 / 10.4	100.0%	8.6
Cultivating	22.7 / 7.9	9.6 / 3.0	61.5 / 15.6	6.2 / 9.6	100.0%	9.0
Threshing	0 / 0	80.6 / 17.5	19.4 / 3.4	0 / 0	100.0%	5.2
Hauling	L6.L / 11.9	41.4 / 27.6	28.3 / 15.4	13.7 / 44.5	100.0%	24.8
Custom Work	49.9 / 10.3	9.5 / 1.9	34.9 / 5.5	5.7 / 5.4	100.0%	5.9
Scraping & Leveling	26.6 / 6.4	43.7 / 9.5	21.2 / 3.7	8.5 / 9.0	100.0%	7.3
Planting	14.3 / .3	0 / 0	35.7 / 3.3.	0 / 0	100.0%	2.8
	100.0%	100.0%	100.0%	100.0%		

*35.6 percent of all plowing was done in the springtime

**55.3 percent of all springtime tractor use was for plowing.

Table VIII
Types of Crops on Which Tractors Were Used.
Number of Jeribs and Percent
Of Usage by Area of Various Crops

	NORTH Av. No. Jeribs Per Tractor				CENTRAL Av. No. Jeribs Per Tractor			
	Own Land	Others Land	Total	Percent of total Tractor Use	Own Land	Others Land	Total	Percent Of Total Tractor
Irrigated Wheat	136.0	24.1	160.1	35.2	102.3	35.8	138.1	18.2
Dryland Wheat	77.4	0	77.4	17.0	230.7	308.7	539.0	70.9
Corn	15.4	0	15.4	3.4	0	0	0	0
Barley	22.0	0	22.0	4.8	1.7	0	1.7	.2
Mung Beans	5.7	0	5.7	1.3	0	0	0	0
Cotton	53.2	14.3	67.5	14.8	0	0	0	0
Clover & Alfalfa	1.1	0	1.1	.2	40.6	1.3	41.9	5.5
Oilseeds	15.4	0	15.4	3.4	11.7	0	11.7	1.5
Melons	5.9	0	5.9	1.3	7.0	0	7.0	.9
Other	18.6	65.8	84.4	18.6	21.3	0	21.3	2.8
Total	350.7	104.2	454.9	100.0	415.3	345.4	760.7	1000

Table VIII
(continued.)

SOUTH				OVERALL			
Average No. Jeribs Per Tractor			Percent of Total Tractor Use	Average No, Jeribs Per Tractor			Percent of total Tractor Use
Own Land	Others' Land	Total		Own Land	Others' Land	Total	
348.3	32.9	381.2	75.1	213.8	30.9	244.7	43.7
0	0	0	0	87.5	84.1	171.6	30.7
41.8	0	41.8	8.2	22.0		22.0	3.9
15.7	0	15.7	3.1	13.9	0	13.9	2.5
5.1	0	5.1	1.0	3.9	0	3.9	.7
20.1	14.3	34.4	6.8	25.2	10.4	35.6	6.4
7.1	0	7.1	1.4	14.3	.4	14.7	2.6
0	0	0	0	8.1	0	8.1	1.4
4.9	0	4.9	1.0	5.8	0	5.8	1.0
17.3	0	17.3	3.4	18.7	20.9	39.6	7.1
460.3	47.2	507.5	100.0	413.1	146.7	559.8	100.0

Table IX

AVERAGE NUMBER OF FIELDS AND AVERAGE SIZE IN JERIBS OF LARGEST AND SMALLEST FIELD ON WHICH TRACTORS WERE USED

	Number of Fields	Largest Field	Smallest Field	All Fields
North	7.	295	9.4	
Central	12	276	23.0	
South	--	136	8.8	46.8
Overall	--	224.8	12.9	

Table X shows which of these implements were owned, most used and least used, by area. For the overall study, the plow was most used and the scraper, or blade, was least used. Very few implements not included in the package deal had been obtained by tractor owners. In the south, farmers indicated which additional implements they would like to buy. Of [illegible]7 responses (several tractor owners indicated more than one implement) fifteen wanted grain drills, fourteen wanted threshers and eight wanted a a ridger-ditcher attachment. Other implements mentioned were: mower - 2, manure spreader - 2, cotton planter - 1, and feed grinder - 1. These responses, although not indicative of effective demand, do show which implements farmers feel the greatest need for in the south.

Ownership Costs:

Tractors were sold with implements as follows:

Byelarus -- 26[illegible],262,3[illegible] afs

Massey-Ferguson -- 363,353,37 afs.

Terms were five years to repay at 6% interest on unpaid balance. A 25% down-payment was required. Total cost of

tractors and implements, including interest, was 300,039.17 afs for the Byelarus tractor and 313,650.65 afs for the Massey-Ferguson tractor. Tractor taxes were reported by some owners to be as high as 15,000 afs per year.

Table XI shows what operators expected in terms of useful life and salvage value and, consequently, depreciation (calculated by the straight-line method). According to the experience of Indamer Workshop in Kabul and Mr. Arden Fabricius, the Agricultural Engineer at the Faculty of Agriculture at Kabul University, these estimates are overly optimistic. Actual depreciation per year should be about 27,000 afs per year for the Byelarus tractor and 42,000 afs per year for the Massey-Ferguson, assuming about ten years of useful life for the Byelarus and nine years for the Massey-Ferguson. These are raw estimates, based on information from <u>Costs of Owning and Operating Farm Machinery</u> by Greer, et al., University of Nebraska, U. S. A.

<u>Operating Costs</u>:

Operating costs for three regions are shown in Table XII. Per hour fuel costs for the Byelarus tractor are almost 60 percent higher than for the Massey-Ferguson and time required for various operations does not seem to differ greatly between the Massey-Ferguson and Byelarus tractors.

Due to differences in enumeration techniques, the authors believe that costs other than fuel and oil costs and wages were understated, especially in the north and central areas. The following total operating costs are felt to be more in line with reality.

North (Byelarus)	80,000 afs per year
Central (M-F)	100,000 afs per year
South (M-F)	95,000 afs per year

Table XI

TRACTOR DEPRECIATION SCHEDULES BY REGION
TRACTOR OWNERS" EXPECTATION OF USEFUL LIFE AND SALVAGE VALUE

	NORTH	CENTRAL	SOUTH
Make of Tractor	Byelarus	MF	MF
Original Cost plus Interest (5 years 6%)	311,329	435,247	435,247
Useful Life	19	32	12
Salvage Value	11,111	43,000	77,222
Depreciation/Year	15,327	12,101	29,335

The reader should bear in mind that total costs are for differing yearly usage -- 1133 hours per year in the north, 2191 in the central area and 1500 in the south.

Although the Massey-Ferguson tractors in the south were older than those in the central area, they were used more intensively and, therefore, probably required about the same amount of repairs. Repairs include tires and batteries although none of the owners had replaced rear tires.

Costs of fuel vary from 20 afs per imperial gallon (16.7 afs per U. S. gallon) to 4 afs per litre (15.14 afs per U. S. gallon). In addition, irregularities involving extra costs in obtaining fuel and parts were reported. For fuel, these could not have been very bad, however, because our computation of fuel consumption

Table X

TRACTOR IMPLEMENT UTILIZATION IMPLEMENTS OWNED MOST USED AND LEAST USED, BY REGION AND IN OVERALL STUDY

	NORTH				CENTRAL				SOUTH				OVERALL			
	Owned	Most Used	Least Used	Never Used	Owned	Most Used	Least Used	Never Used	Owned	Most Used	Least Used	Never Used	Owned	Most Used	Least Used	Never Used
Plow	14	10	--	--	12	3	1	--	18	17	0	--	44	30	1	--
Disc	14	1	2	--	12	1	7	4	18	10	6	--	44	12	15	4
Field Cultivator*	2	--	--	--	11	7	--	--	18	8	--	--	31	15	--	--
Trailer	14	4	--	--	12	1	--	--	18	2	4	--	44	5	3	--
Scraper	14	7	--	--	12	3	1	--	18	2	8	--	44	5	16	--
Seeder	1	--	--	1	1	--	1	--	--	--	--	--	2	--	1	1
Harvester	--	--	--		1	--	1	--	--	--	--	--	1	--	1	--
Pulley	1	--	--	1	2	--	--	1	--	--	--	--	3	--	--	2

*In the north and central, used for plowing.

Table 4.

COSTS (AFGHANIS) PER JERIB OF PRODUCING
IRRIGATED WHEAT-TRADITIONAL METHOD
AFGHANISTAN -- 1968

	Units Per Jerib (seers)	Cost Per Unit	Cost/Jerib "Out-of-Pocket" Expenses	Other Expenses	Total Costs Per Jerib
Materials: Seed	4	39	56	100	156
Fertilizer: Commercial	1	35	35		35
Organic	31*	4	62	62	124
Livestock Feed			157	156	313
Hired Labor	6 (days)	44**	264		264
Depreciation			33		33
Miscellaneous: Taxes			5	8	13
Interest on Borrowed Capital			20		20
Canal and/or Kariz Repair***			10		10
Other			7	—	7
Total Cost			649	326	975

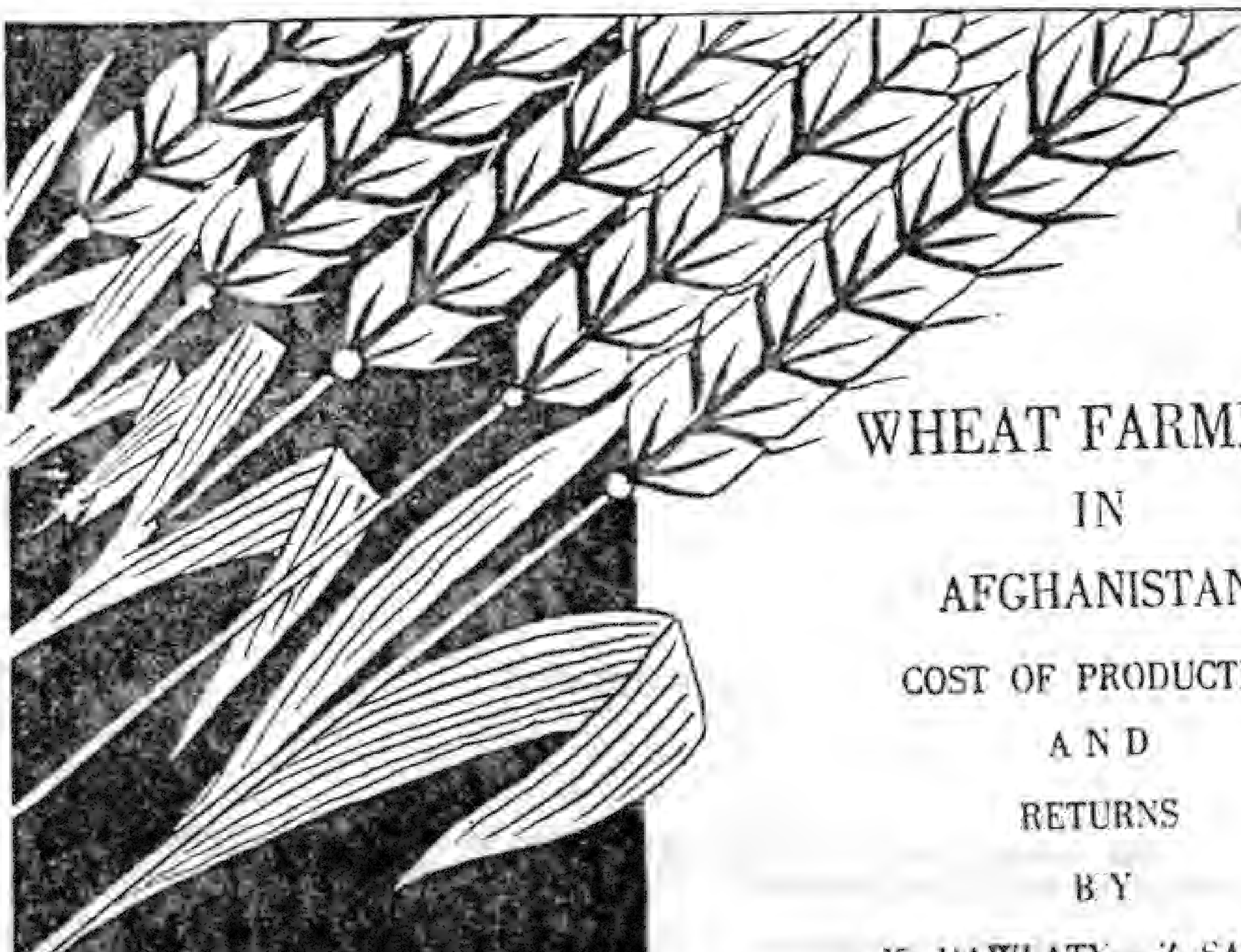
*Donkey loads -- One donkey load equals approximately 130 lbs.

**34 afs plus two meals per day.

***Money contribution only -- does not include equipment usage or labor which is accounted for in other categories.

Box # 1

A 684



WHEAT FARMING IN AFGHANISTAN

COST OF PRODUCTION AND RETURNS

BY

K. DAWLATY - Z. SALEH

AND

G. P. OWENS



TECHNICAL BULLETIN No.17

FACULTY OF AGRICULTURE

UNIVERSITY OF KABUL

KABUL - AFGHANISTAN

JUNE 1970

ACKNOWLEDGMENTS

The authors wish to express appreciation to the Research Foundation at Kabul University for encouraging and funding this project.

Appreciation is expressed to Dean Alekozai and Acting Dean Nawabi of the Faculty of Agriculture for their assistance and encouragement.

Appreciation is due in great measure to those who did the work -- the enumerators, Mr. Abdul Rashid Jalili, Mr. Mohammed Hakim Malyar, Mr. Mohammed Shuaeb, Mr. Mohammed Younus Gardazi, Mr. Mirdad, to the farmers who provided the information, and to our colleagues who helped tabulate the data and finalize the manuscript.

WHEAT FARMING IN AFGHANISTAN --

COST OF PRODUCTION AND RETURNS

by

Khairullah Dawlaty
Assistant Professor of Agricultural Economics

Zarghuna Saleh
General Economics Assistant

Gerald P. Owens
Agricultural Extension Economist
The University of Wyoming Team

Technical Bulletin No. 17

FACULTY OF AGRICULTURE

KABUL UNIVERSITY

Kabul, Afghanistan

July 1970

TABLE OF CONTENTS

LIST OF TABLES